ISSN 0387-4508

TRANSACTIONS
OF
J W R I

Vol. 54
2025

JOINING AND WELDING RESEARCH INSTITUTE
OSAKA UNVERSITY
JAPAN

Research Divisions and Researchers (December 2025)

Director Dr. Fujii Hidetoshi

1. Research Division of Materials Joining Process

1) Energy Control of Processing

Professor	Dr. TANAKA Manabu
Associate Professor	Dr. KOMEN Hisaya
Assistant Professor	Dr. TASHIRO Shinichi
Guest Professor	Mr. SATO Toyoyuki
Visiting Researcher	Dr. ISHIDA Kazuya

2) Energy Transfer Dynamics

Professor	Dr. SETSUHARA Yuichi
Associate Professor	Dr. TAKENAKA Kosuke
Assistant Professor	Dr. TOKO Susumu
Guest Professor	Dr. ONO Kouichi
Guest Professor	Dr. UCHIDA Giichiro

3) Micro Joining

Professor	Dr. NISHIKAWA Hiroshi
Associate Professor	Dr. TATSUMI Hiroaki
Guest Professor	Dr. CHAN Yon Cheong
Guest Professor	Dr. LIN Shih-Kang
Guest Professor	Dr. WU Tzu-Chia
Guest Professor	Dr. TAKAHASHI Yasuo
Specially Appointed Researcher	Dr. NAOE Takuya
Specially Appointed Researcher	Dr. GAO Runhua

4) Laser Materials Processing

Professor	Dr. TSUKAMOTO Masahiro
Associate Professor	Dr. SATO Yuji
Assistant Professor	Dr. TAKENAKA Keisuke
Guest Professor	Dr. KIKUCHI Yasushi
Guest Professor	Dr. ABE Nobuyuki
Guest Associate Professor	Dr. NISHIO Masahiro
Specially Appointed Researcher *	Ms. HIGASHINO Ritsuko
Specially Appointed Researcher	Mr. YOSHIDA Norio
Specially Appointed Researcher	Mr. TOKUMOTO Jumpei
Specially Appointed Professor	Dr. KATO Susumu
Specially Appointed Researcher	Mr. HORI Eiji

5) Advanced Engineering Science

Guest Professor	Dr. HIGURASHI Eiji

2. Research Division of Materials Joining Mechanism

1) Welding Mechanism

Professor	Dr. ITO Kazuhiro
Associate Professor *	Dr. TAKAHASHI Makoto
Assistant Professor	Dr. YAMAMOTO Hajime
Assistant Professor	Dr. HONG Seong Min
Specially Appointed Associate Professor	Dr. ZHAO Bingbing
Guest Professor	Dr. OGAWA Kazuhiro
Guest Professor	Dr. SHARMA Abhay

2) Joint Interface Structure and Formation Mechanism

Professor	Dr. FUJII Hidetoshi
Assistant Professor	Dr. YAMASHITA Takayuki
Assistant Professor	Dr. SHARMA Abhishek
Specially Appointed Professor	Dr. USHIODA Kohsaku
Specially Appointed Associate Professor	Dr. MORISADA Yoshiaki
Specially Appointed Associate Professor	Dr. CHEN Juan
Specially Appointed Associate Professor	Dr. AOKI Yasuhiro
Guest Professor	Dr. NAGIRA Tomoya
Guest Professor	Mr. KAWAI Teruaki
Guest Professor	Mr. MUKUDA Muneaki
Guest Professor	Dr. KOMIZO Yu-ichi
Guest Professor	Dr. EMURA Masaru
Guest Professor	Dr. NISHIKIORI Sadao
Specially Appointed Researcher	Mr. KAMAI Masayoshi
Specially Appointed Researcher	Mr. OGURA Takuya

3) Composite Materials Processing

Professor	Dr. KONDOH Katsuyoshi
Professor	Dr. UMEDA Junko
Associate Professor	Dr. KARIYA Shota
Guest Professor	Dr. MA Qian
Guest Professor	Dr. YANG Yafeng
Guest Professor	Dr. LI Shufeng
Guest Professor	Dr. OZAKI Yukiko
Guest Professor	Dr. OZAKI Kimihiro
Guest Professor	Dr. CHEN Ke
Specially Appointed Researcher	Mr. HUANG Jeff
Specially Appointed Researcher	Mr. MINAMITANI Ryoji
Visiting Researcher	Dr. SHITARA Kazuki

3. Research Division of Materials Joining Assessment

1) Joining Mechanics and Analyses

Professor	Dr. MA Ninshu
Guest Professor	Dr. LU Fenggui
Specially Appointed Professor	Dr. NAKAO Kazushige
Specially Appointed Assistant Professor	Dr. HUANG Wenjia
Specially Appointed Researcher	Mr. NARASAKI Kunio

2) Joining Design and Structuring

Professor	Dr. MIKAMI Yoshiki

3) Joining Metallurgical Evaluation

Professor	Dr. IKEDA Rinsei
Associate Professor	Dr. KADOI Kota

4. Research Center for Additive Joining Application

Center Director, Professor	Dr. ITO Kazuhiro

1) Green Additive Manufacturing

Professor *	Dr. ABE Hiroya
Assistant Professor *	Dr. KOZAWA Takahiro
Guest Professor	Dr. AKEDO Jun

2) Lithographic Additive Manufacturing

Professor	Dr. KIRIHARA Soshu
Assistant Professor	Dr. SPIRRETT Fiona
Specially Appointed Professor	Dr. FUJIMOTO Shinji

3) Additive Manufacturing Mechanism

Professor *	Dr. KONDOH Katsuyoshi
Professor *	Dr. UMEDA Junko
Associate Professor *	Dr. KARIYA Shota

4)Laser Additive Manufacturing

Professor *	Dr. TSUKAMOTO Masahiro
Associate Professor *	Dr. SATO Yuji
Assistant Professor *	Dr. TAKENAKA Keisuke
Specially Appointed Professor *	Dr. KATO Susumu
Specially Appointed Researcher *	Mr. HORI Eiji
Specially Appointed Researcher *	Mr. YOSHIDA Norio

5)Advanced Additive Manufacturing

Professor *	Dr. FUJII Hidetoshi
Professor *	Dr. NAKANO Takayoshi
Guest Professor	Dr. MURPHY Anthony B.
Guest Professor	Dr. GOODRIDGE Ruth
Guest Professor	Dr. GOECKE Sven-Frithjof
Guest Professor	Dr. YAMAMOTO Motomichi

5. Strategy Office for Promotion of Inter-Institute Collaborations

Leader, Professor *	Dr. SETSUHARA Yuichi
Professor	Dr. ABE Hiroya
Assistant Professor	Dr. MOKUDAI Takayuki
Assistant Professor	Dr. KOZAWA Takahiro
Assistant Professor	Dr. CANTON VITORIA Ruben
Assistant Professor	Dr. ISSARIYAPAT Ammarueda
Assistant Professor	Dr. PALAI Debabrata
Guest Professor	Dr. AKEDO Jun
Guest Professor	Dr. MASAHASHI Naoya

6. Joint Interface Microstructure Characterization Room

Associate Professor	Dr. TAKAHASHI Makoto

7.Global D&I Promotion Office

Professor *	Dr. UMEDA Junko
Associate Professor	Ms. KATSUMATA Mihoko
Assistant Professor *	Dr. HONG Seong Min
Assistant Professor *	Dr. SPIRRETT Fiona
Technical Specialist *	Ms. UEHARA Kunika

8. New Normal Manufacturing Consortium Office

Professor	Dr. SERIZAWA Hisashi
Guest Professor	Dr. FUJITA Sakae
Visiting Researcher	Dr. CHIBA Koji
Visiting Researcher	Mr. KAWAHARA Atsushi
Specially Appointed Researcher	Dr. SHOTRI Rishabh

9. DAIHEN Welding and Joining Research Alliance Laboratories

Director, Professor *	Dr. FUJII Hidetoshi
Vice Director, Guest Professor	Dr. ERA Tetsuo
Specially Appointed Professor	Dr. ASAI Satoru
Specially Appointed Assistant Professor	Ms. TAKEI Yuko
Guest Associate Professor	Dr. KADOTA Keiji
Professor *	Dr. TANAKA Manabu
Professor *	Dr. ITO Kazuhiro
Professor *	Dr. TSUKAMOTO Masahiro
Professor *	Dr. SETSUHARA Yuichi

10. Nippon Steel Future Manufacturing Research Alliance Laboratories

Director, Professor *	Dr. FUJII Hidetoshi
Vice Director, Guest Professor	Dr. NISHIBATA Hitomi
Guest Professor	Dr. INOUE Hiroshige
Guest Professor	Dr. SAIDA Kazuyoshi
Specially Appointed Assistant Professor	Ms. JOTOKU Kana
Visiting Researcher	Mr. OKADA Toru
Visiting Researcher	Mr. WATANABE Koutarou
Visiting Researcher	Mr. NOMOTO Masashi
Visiting Researcher	Mr. SHIMADA Naoaki
Visiting Researcher	Mr. ARAI Yuji
Visiting Researcher	Mr. TACHIBANA Hayato
Visiting Researcher	Dr. AIBARA Takumi
Professor *	Dr. TANAKA Manabu
Professor *	Dr. MIKAMI Yoshiki
Associate Professor *	Dr. KADOI Kota
Professor *	Dr. HIRATA Hiroyuki
Associate Professor	Dr. OKANO Shigetaka
Associate Professor *	Dr. YAMASHITA Shotaro

11. Honda-Osaka Univ. Joining Technology Monozukuri Research Alliance Laboratories

Professor *	Dr. FUJII Hidetoshi
Guest Professor	Mr. WATANABE Shinya
Professor *	Dr. IKEDA Rinsei
Professor *	Dr. SERIZAWA Hisashi
Specially Appointed Researcher	Mr. TOYODA Hiroki
Visiting Researcher	Mr. KAMIKURA Masanobu
Guest Researcher	Mr. MURAKAWA Toshihiro
Visiting Researcher	Mr. KOBAYASHI Haruhiko
Guest Researcher	Mr. SAITO Hitoshi
Specially Appointed Professor *	Dr. USHIODA Kohsaku
Specially Appointed Associate Professor *	Dr. MORISADA Yoshiaki
Specially Appointed Associate Professor *	Dr. AOKI Yasuhiro
Assistant Professor *	Dr. YAMASHITA Takayuki
Specially Appointed Assistant Professor *	Dr. SHARMA Abhishek
Specially Appointed Researcher *	Dr. SHOTRI Rishabh
Specially Appointed Researcher *	Mr. KAMAI Masayoshi
Graduate School of Engineering, Associate Professor *	Dr. NOMURA Kazufumi

12. Nissan Advanced Joining & Welding Joint Research Chair

Visiting Professor	Mr. TARUI Taishi
Visiting Professor	Dr. WATANABE Yufu
Visiting Researcher	Mr. KAMIMURA Takumi
Visiting Researcher	Mr. ISHII Katsuyuki
Visiting Researcher	Mr. KINOSHITA Keisuke
Visiting Researcher	Mr. MATSUOKA Takashi

13. Osaka Fuji "Advanced Functional Processing" Joint Research Chair

Professor *	Dr. TSUKAMOTO Masahiro
Associate Professor *	Dr. SATO Yuji
Specially Appointed Assistant Professor	Mr. HAYASHI Yoshihiko
Specially Appointed Researcher	Mr. IKEDA Keiichirou
Visiting Researcher	Dr. MORIMOTO Kento
Visiting Researcher	Mr. TATSUMI Yoshihiro

14. Global and Industrial Collaborative Research Center for Computational Welding Science (CCWS)

Leader, Professor *	Dr. MA Ninshu
Guest Professor	Dr. MURAKAWA Hidekazu
Guest Professor	Dr. LI ChangJiu
Guest Professor	Dr. NAKAO Kazunari
Guest Professor	Dr. FUJIKUBO Masahiko
Guest Professor	Dr. SHIBAHARA Masakazu
Guest Associate Professor	Dr. MIYAMOTO Kenji

15. Joining Technology Hub

Leader, Professor *	Dr. FUJII Hidetoshi
Professor *	Dr. TANAKA Manabu
Professor *	Dr. ITO Kazuhiro
Professor *	Dr. SERIZAWA Hisashi
Professor *	Dr. IKEDA Rinsei
Professor *	Dr. MA Ninshu
Professor *	Dr. TSUKAMOTO Masahiro
Professor *	Dr. MIKAMI Yoshiki
Associate Professor *	Dr. SATO Yuji
Assistant Professor *	Dr. YAMASHITA Takayuki
Specially Appointed Professor	Dr. USHIODA Kosaku
Specially Appointed Associate Professor *	Dr. MORISADA Yoshiaki
Specially Appointed Associate Professor *	Dr. AOKI Yasuhiro
Specially Appointed Associate Professor *	Dr. SHARMA Abhishek
Graduate School of Engineering, Professor *	Dr. SAIDA Kazuyoshi
Graduate School of Engineering, Professor *	Dr. OHATA Mitsuru
Graduate School of Engineering, Professor *	Dr. SANO Tomokazu
Graduate School of Engineering, Associate Professor *	Dr. OGURA Tomo
Graduate School of Engineering, Associate Professor *	Dr. OGINO Yosuke
Graduate School of Engineering, Associate Professor *	Dr. NOMURA Kazufumi
Graduate School of Engineering, Assistant Professor *	Dr. MATSUDA Tomoki
Graduate School of Engineering, Assistant Professor *	Dr. SHOJI Hiroto

16. Co-Creation Consortium for Joining and Welding with Blue Diode Laser

Professor *	Dr. TSUKAMOTO Masahiro
Associate Professor *	Dr. SATO Yuji
Guest Professor	Dr. ABE Nobuyuki
Assistant Professor *	Dr. TAKENAKA Keisuke
Specially Appointed Researcher	Ms. HIGASHINO Ritsuko

17. Industry Cooperation Office

Professor *	Dr.TANAKA Manabu

***** Supplementary Assignment

Transactions of JWRI, Vol.54, 2025

CONTENTS

RESEARCH ACTIVITIES OF JWRI

Research Division of Materials Joining Process
Dep. of Energy Control of Processing 1
Dep. of Energy Transfer Dynamics 2
Dep. of Micro Joining 3
Dep. of Laser Materials Processing 4

Research Division of Materials Joining Mechanism
Dep. of Welding Mechanism 5
Dep. of Joint Interface Structure and Formation Mechanism 6
Dep. of Composite Materials Processing 7

Research Division of Materials Joining Assessment
Dep. of Joining Mechanics and Analyses 8
Dep. of Joining Design and Structuring 9
Dep. of Joining Metallurgical Evaluation 10

Research Center for additive Joining Application(RAJA)
Dep. of Green Additive Manufacturing 11
Dep. of Lithographic Additive Manufacturing 12
Dep. of Additive Manufacturing Mechanism 13
Dep. of Laser Additive Manufacturing 14

Strategy Office for Promotion of Inter-Institute Collaborations 15

Joint Interface Microstructure Characterization Room 16

Global D&I Promotion Office 17

New Normal Manufacturing Consortium Office 18

Osaka Fuji "Advanced Functional Processing" Joint Research Chair 19

CONTRIBUTION TO OTHER ORGANIZATIONS 20

Research Division of Materials Joining Process, Dep. of Energy Control of Processing

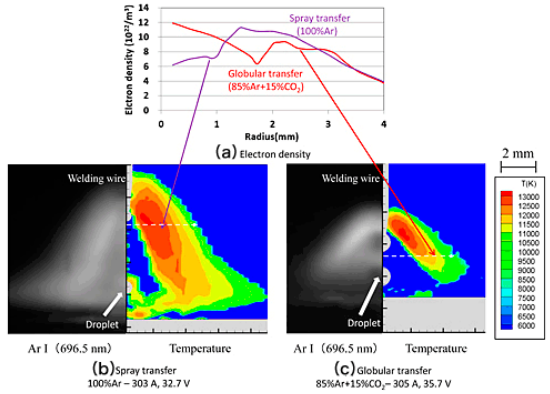
Research summary

The main research subject is the development of the high density energy source for processing advanced materials having special functions and properties. We undertake fundamental investigations of the properties of the high energy source interacting with materials, and we study advanced control techniques for optimizing the energy transport.

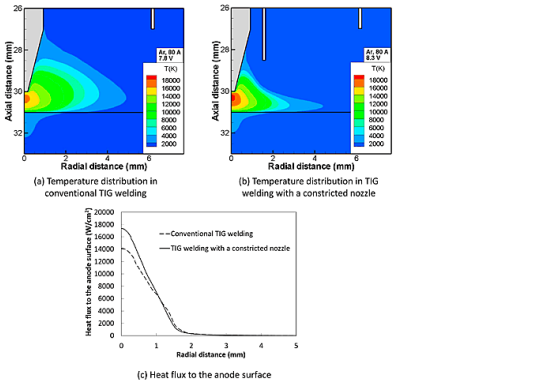
Major emphasis is placed on the generation, control and energy transport in arc plasmas, which are a high density energy source which have been applied to a variety of materials processing techniques such as welding, cutting, heating, high temperature processing, surface modification and the creation of powders.

Research subjects

(1) Generation and control of thermal plasmas, and their application to welding and joining processes
(2) Arc physics, molten pool behavior, and transport theory in fusion welding
(3) Development of new arc electrodes based on the analysis of electrode-plasma interaction
(4) Development of advanced high quality clean welding processes
(5) Development of new generation welding and joining processes employing atmospheric pressure plasma
(6) Control of arc discharge in lighting and electrical devices



Optical measurement of electron density and plasma temperature during spray transfer and globular transfer in gas metal arc welding process ((a) Electron density, (b) Spray transfer, (c) Globular transfer). An addition of CO_2 into shielding gas causes constriction of arc current toward the arc axis, which leads to globular transfer due to increase in arc pressure.



Numerical simulation on effects of constricted nozzle on arc phenomena in TIG welding process ((a) Temperature distribution in conventional TIG welding, (b) Temperature distribution in TIG welding with a constricted nozzle, (c) Heat flux to the anode surface). In TIG welding with a constricted nozzle, arc temperature increases due to constriction of arc. Consequently, larger heat flux to the anode surface is obtained compared with that of conventional TIG welding.

Major Papers

K. Aoyama, H. Komen, M. Tanaka, K. Konishi, K. Taniguchi, S. Igi, "Investigation of the meandering bead formation process in metal inert gas welding", Weld. World. (2025), 02149-5. doi

M. Miwa, H. Komen, M. Tanaka, Y. Tanabe, Y. Matsuo, K. Hyoma, K. Inose, A. Murata, "Particle Method Simulation of Blowhole Forming Process during Gas Metal Arc Welding", ISIJ Int., 65 (2025), 1929-1936. doi

J. Liu, F. Jiang, S. Tashiro, S. Chen and M. Tanaka, "A physics-informed and data-driven framework for robotic welding in manufacturing", Nat. Commun., 16(2025), 4807. doi

V. H. Bui, Q. N. Trinh, D. K. Le, S. Tashiro, L. D. Han, H. L. Phan, A. B. Murphy, K. Yamanaka, M. Tanaka and L. Xiao, "Effect of external magnetic field on arc characteristics and weld bead formation in metal-cored arc welding", Int. J. Adv. Manuf. Technol., 140(2025), 4845–4858. doi

X. Xiao, C. Zhang, S. Bai, D. Wu, H. Komen, K. Zhang, S. Uchida, M. Tanaka " Volatile alloying elements modulate laser-induced arc stability: A material-dependent interaction mechanism", J. Mater. Res. Technol-JMRT, 38(2025), 1643-1650. doi

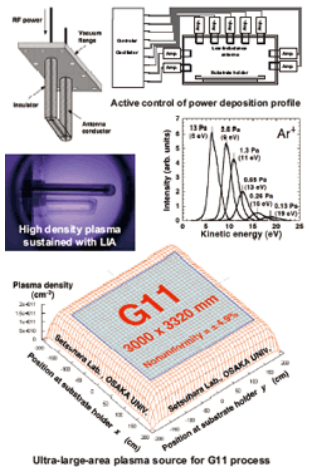
Research Division of Materials Joining Process, Dep. of Energy Transfer Dynamics

Research summary

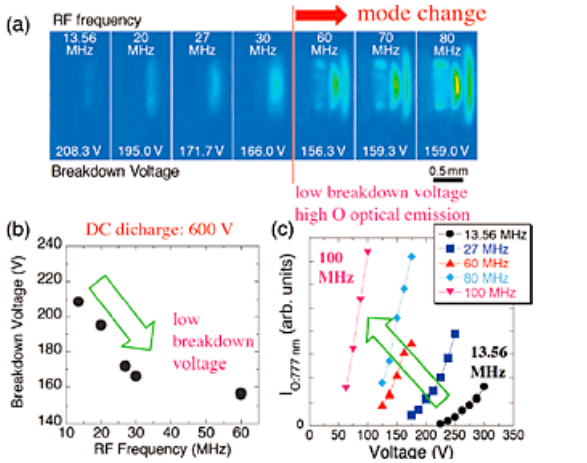
Our research activities encompass works on development of process control technologies of surface and interface for advancement of materials joining science and processing technologies through creation of novel process-energy sources (plasmas and particle beams), and span the range of applications from to functionalization of materials to their process control. These research activities are based on fundamental studies on energy transfer dynamics involved in a variety of materials processing with process-energy sources.

Research subjects

(1) Development of novel plasma sources and particle beams for advanced process technologies (CVD, PVD)
(2) Development of novel large-area, low-damage and high-density plasma sources for advanced process control of functional materials
(3) Development of novel large-area, low-damage and high-density plasma sources for advanced process control of functional materials
(4) Creation of softmaterial processing science for development of advanced green nanotechnologies with inorganic/organic flexible hybrid structures
(5) Studies on temporal and spatial control of discharge for development of innovative plasma sources for plasma medicine



Low-damage and ultra-large-area plasma source with multiple low inductance antenna modules



Development of innovative plasma source for plasma medicine
(a) ICCD images of atmospheric RF plasmas
(b) Frequency dependence of discharge breakdown voltage
(c) Frequency dependence of O optical emission intensity

Major Papers

S. Kakuta, K. TAKENAKA, M. Takahashi, Y. Setsuhara, T. Okada, "Photocatalytic decomposition of methylene blue using a zinc–tungsten oxide compound prepared by co-sputtering and calcination", Jpn. J. Appl. Phys., 64 (2025) 04SP07/1-5. doi

S. Toko, K. Takenaka, K. Koga, M. Shiratani, M. Ozawa, Y. Setsuhara, "Effective use of molecular sieves for methanation with plasma catalysis", Jpn. J. Appl. Phys., 64 (2025) 076003/1-7. doi

K. Takenaka, T. Nagata, K. Ota, Y. Setsuhara, T. Ohta, "Low-temperature deposition of crystalline IGZO films using high-power pulsed magnetron sputtering", Jpn. J. Appl. Phys., 138 (2025) 085302/1-8. doi

K. Takenaka, R. Koyari, S. Shigemori, G. Uchida, Y. Setsuhara, "Effect of Atmospheric Pressure Nonequilibrium Plasma Pretreatment of Polyethylene/Polypropylene on Epoxy Adhesively Bonded Joints", Plasma Process. Polym., 22(10) (2025) e70072. doi

K. Takenaka, S. Nakamoto, M. Shimabukuro, A. Jinda, R. Koyari, S. Shigemori, K. Ueno, S. Toko, G. Uchida, M. Kawashita, Y. Setsuhara, "Effect of surface treatment using non-thermal atmospheric pressure plasma jet on dissimilar material direct joining using Polyetheretherketone" Surf. Interfaces, 79 (2025) 108187/1-9. doi

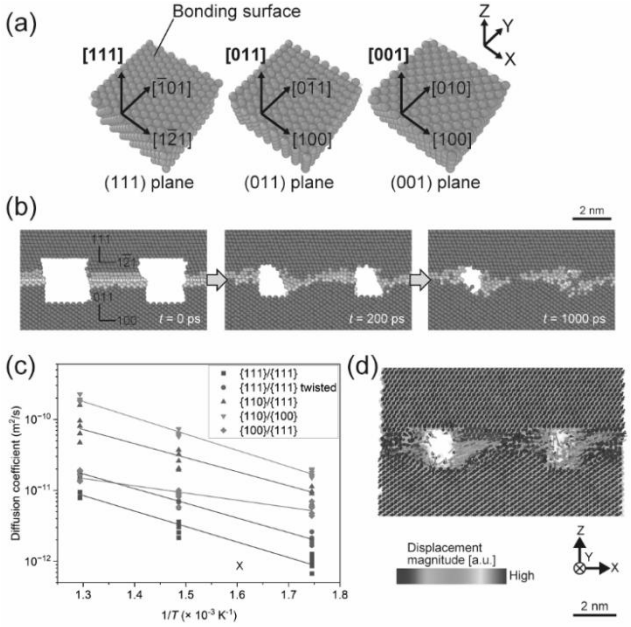
Research Division of Materials Joining Process, Dep. of Micro Joining

Research summary

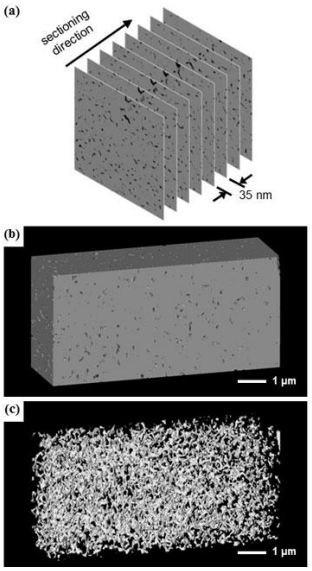
The main research objectives are for electronics packaging to develop advanced joint materials, to establish advanced micro joining processes, and to elucidate the mechanisms of the micro joining processes. Especially, the creation of the functional joint materials, the development of novel advanced micro processes by various energy sources, the understanding of interfacial behaviors in nano-/micro-scale, and the enhancement of the highly reliable joints based on the control of interfacial structure and performance are performed.

Research subjects

(1) Development and evaluation of advanced micro joining process
(2) Elucidation of micro joining phenomena and defect suppression
(3) Control and analysis of microstructure at soldered interface
(4) Development of low-temperature solder alloys contributing to the reduction of CO_2 emissions
(5) Formation of high heat-resistance joint using three-dimensional nanostructure
(6) Elucidation of interfacial bonding mechanisms through atomistic simulation
(7) Macro-micro simulation for joint-property prediction



Molecular Dynamics (MD) simulation results on Cu-Cu bonding behavior: (a) Bonding interfaces replicating various crystal orientations, (b) Void closure behavior at the interface, (c) Diffusion coefficients on the bonding interface with various orientations, (d) Atomic displacement vectors analysis.



Microstructure of sintered joint using Ag nanoparticle paste
(a)Serial sectioning of Ag sintered layer by FIB/SEM system
(b)Reconstructed 3D image of Ag sintered layer
(c)Reconstructed 3D pore distribution into Ag sintered layer

Major Papers

H. Tatsumi, S. Nitta, A. M. Ito, A. Takayama, M. Takahashi, S. Moon, E. Tsushima, H. Nishikawa, "Experimental and first-principles insights into Ti-mediated Cu–Si3N4 interfaces for high-reliability electronic substrates", Acta Mater., 304, (2025), 121813. doi

H. Tatsumi, C. R. Kao, H. Nishikawa, "Atomistic behavior of Cu–Cu solid-state bonding in polycrystalline Cu with high-density boundaries",Mater. Des.,250, (2025), 113576. doi

J.-H. Kim, H. Tatsumi, H. Nishikawa, "Direct formation of Cu nano-dendritic structure on substrate by dynamic hydrogen bubble template for organic-free sintered Cu-to-Cu bonding", Surf. Interfaces., 62, (2025), 106268. doi

X. Wang, H. Tatsumi, C.-L. Li, J.-W. Lee, H. Nishikawa, "Ion milling-enhanced preferential growth of CoSn3 for crystallographic orientation control of Sn on polycrystalline Co substrates", Mater. Des.,261, (2025), 115329. doi

S.-W. Pak, H. Tatsumi, J. Wang, A. T. Wu, H. Nishikawa, "Interfacial reaction and IMC growth kinetics at the Bi2Te3/Ag interface during isothermal aging ", Intermetallics.,179, (2025), 108686. doi

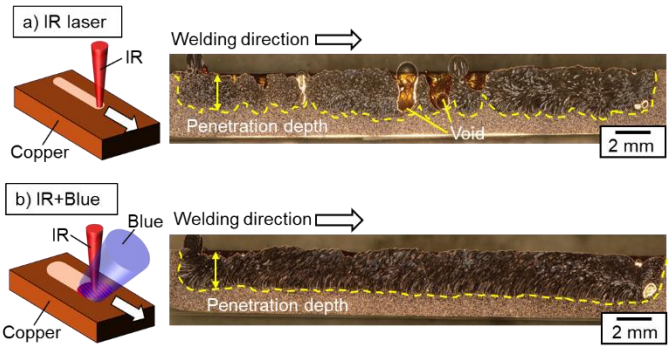
Research Division of Materials Joining Process, Dep. of Laser Materials Processing

Research summary

Fundamental studies are performed concerning welding, joining, cutting, surface modification and removal processing with laser beams, aimed at advanced fusion between laser science and production engineering. We focus on clarification of welding or joining mechanisms on the basis of the visualization of material processing phenomena with high-speed optical observation or X-ray transmission imaging techniques. Moreover, laser should be utilized with not only high thermal efficiency but also physicochemical effects induced by interaction between light and material. Thus we create innovative processes including laser direct joining of metal and plastic, put these processes to practical use and disseminate achievements of our research to the world.

Research subjects

(1) Development and evaluation of joining and welding processes for the advanced functional materials
(2) Development of additive manufacturing technologies with blue diode laser
(3) Creation of new function by surface modification with laser
(4) Fundamental studies on laser interaction with materials and fundamental studies of materials processing utilizing laser



Longitudinal section of welding bead with a) IR fiber laser and b) blue and IR hybrid laser

Clarification of laser welding phenomena with 16 kW disk laser

Major Papers

M. Sudo, S. Fujio, K. Koda, H. Shirai, K. Takenaka, M. Mizutani, T. Pasang, Y. Sato & M. Tsukamoto, "The effect of plume removal on welding efficiency of pure copper using 1.5 kW blue diode laser", Appl. Phys. A-Mater. Sci. Process., 131(4), (2025). 273. doi

T. Kayahara, T. Tanabe, Y. Sato, K. Takenaka, M. Tsukamoto, "Effects of beam shape formed by beam-splitting diffractive optical element on keyhole and molten pool behavior in high-power laser welding of stainless steel", J. Laser Appl., *37*(3), (2025) 032014. doi

Y. Sato, K. Tomita, K. Taniguchi, M. Tsukamoto, "Development of spatter-suppressed high-power laser beam welding for stainless steel", J. Laser Appl., 37(4), (2025) 042016. doi

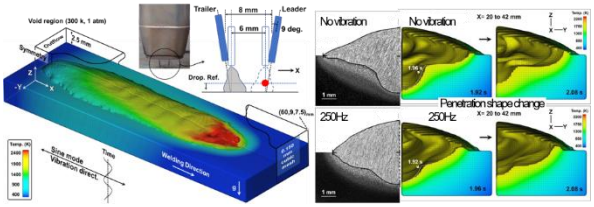
Research Division of Materials Joining Mechanism, Dep. of Welding Mechanism

Research summary

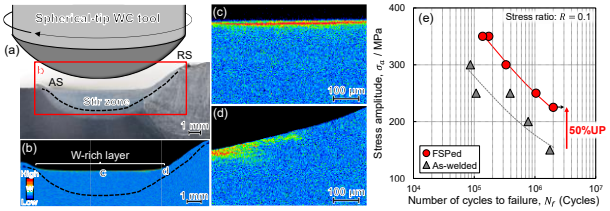
Mechanisms controlling the joint performance of structural and functional materials, which obtained by fusion welding, liquid-state/solid-state bonding, and solid-state bonding, are metallographically characterized to establish a scientific basis to produce joint materials featuring superior performance. The microstructures of the weld-deposited metal, the heat-affected zone of fusion-welded joints, and the interfacial region of solid-state bounded joint are thoroughly investigated utilizing various methods such as X-ray diffraction, electron-microscopy observation, elementary analysis, EBSP analysis, and numerical modeling and simulation. Formation processes of the microstructures and their relation to joint performance are discussed from the material scientific viewpoint.

Research subjects

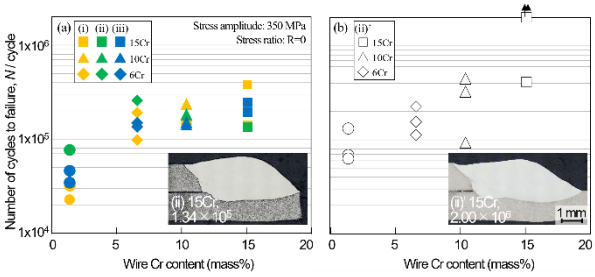
(1) Weld microstructure analyses of structural material such as steel
(2) Bonding mechanism of solid-state joining of metals and ceramics, and its application to microstructural control
(3) Application of welding and joining phenomena to development of advanced materials
(4) Synthesis of new functional materials at welding and joining interface
(5) Evaluation of the effect of microstructure on mechanical behavior of structural materials joints



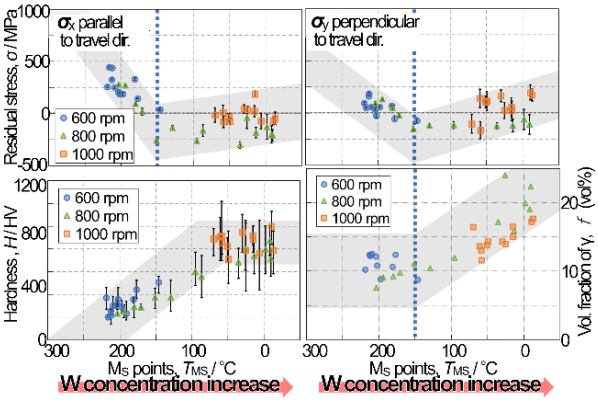
Welding-time variation of penetration shape change in the simulated vibration assisted tandem-pulsed GMAW using the Flow-3D commercial software in the presence of sine-vibration parallel to the welding direction (250 Hz) and the surface tension active elements.



Geometry modification and W-rich layer formation for weld toe of high-strength low-alloy steel joints using friction stir processing (FSP) with spherical-tip WC tool, resulting in fatigue strength improvement.



Number of cycles to failure of a lap-filler arc welded joint of 1.2 GPa grade cold-rolled ultra high tensile strength steel sheets varied with wire Cr content in (a) three welding conditions (i), (ii), (iii) and (b) one welding condition (ii)'. Inset figures are cross-sectional optical images of weld metal after a plane bending fatigue test applied with stress amplitude of 350 MPa, together with wire Cr contents and number of cycles to failure; 1.3x10^5 and more than 2.0x10^{6}cycle.



Variation of residual stress, hardness, and the volume fraction of the retained γ with Ms, depending on W having a solution hardening, in the SZ steel surface FSPed using a WC tool at tool rotational speeds of 600, 800, and 1000 rpm.

Major Papers

S. Semboshi, S. Sato, G. Miyamoto, K. Ito, S. Kasatani, H. Hyodo, "Softening by intense cold rolling and hardening by low-temperature annealing for Cu-Ni-Al alloy", Mater. Sci. Eng., A941, (2025) 148638. doi

K. Toda, R. Suzuki, Y. Hoshino, K. Ito, S. M. Hong, H. Hamed Zargari, S. Ozawa, "Significant Increase of Fatigue Life Caused by Weld-metal Shape Control using High Hardness due to Wire Cr Content for Lap-fillet Arc Welded Joints of 1.2GPa Grade Cold-rolled Ultra High Tensile Strength Steel Sheets", Join. Tech. Adv. Automobile Assembly (JAAA), (2025) 272-279.

Research Division of Materials Joining Mechanism, Dep. of Joint Interface Structure and Formation Mechanism

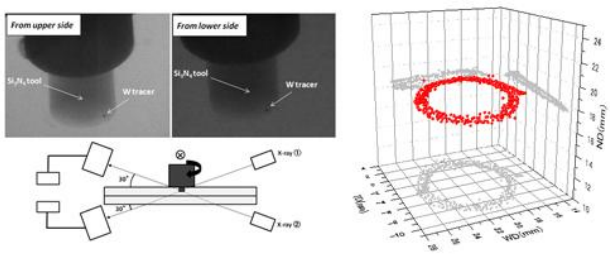
Research summary

In this department, based on the elucidation of the various phenomena at the joint interfaces of ferrous, nonferrous, non-metal materials at both macroscopic and microscopic levels, the interface formation mechanisms during various joining processes are clarified to create new interface control methods.

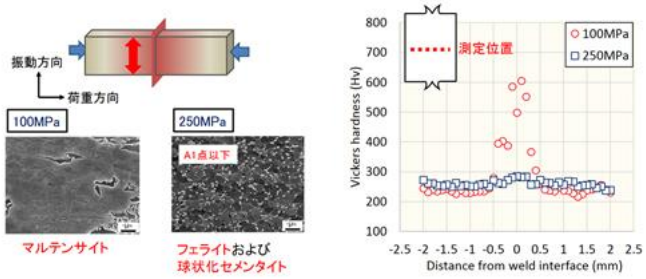
In addition, novel welding and modification processes are developed, mainly based on fusion welding methods and friction welding methods such as the friction stir welding, rotary friction welding and linear friction welding methods, which is the core of the fundamental technologies having a great potential to produce new values. These developments are going to be used and focused simultaneously in our society in order to create a new research field and elevate the continuous growth of industrial competitiveness of our country.

Research subjects

(1) Control of interface and elucidation of formation mechanism during friction welding (FSW, Friction welding, Linear friction welding)
(2) Development of novel joining and modification processes
(3) Elucidation of formation mechanism of weld interface and molten pool
(4) Analysis of joint interface structure
(5) Control of solid-liquid interface formation



Three-dimensional visualization of the material flow using a W tracer during the FSW.



SEM microstructures and Vickers hardness along the central axis of LFWed joints.

Major Papers

A. Sharma, S. Singh, Y. Morisada, K. Ushioda, J. Andersson, H. Fujii, "Microstructural evolution and mechanical behavior of friction stir welded additively manufactured Haynes 282 Ni superalloy", Mater. Des., 260(2025), 115029. doi

R. Shotri, Y. Morisada, K. Ushioda, H. Serizawa, H. Fujii, "Immiscible Cu-SS304 thin tube forge welding via novel PJFW process", Int. J. Mech. Sci., 305(2025), 110780. doi

K. Sheng, S. Guan, Y. Sun, Y. Morisada, H. Fujii, "Research on strength-ductility and fracture behavior of ultra-fine bio-magnesium alloys via double-sided friction stir processing using liquid CO2 cooling", J. Magnes. Alloy, 13(2025), 3725-3739. doi

R. Shotri, T. Miura, P. Geng, Y. Morisada, K. Ushioda, H. Fujii, "Understanding thermal-mechanical variations and resulting joint integrity of pressure-controlled linear friction welding of thin-steel sheets", Int. J. Mach. Tools Manuf., 204(2025), 104235. doi

T. Aibara, M. Kamai, Y. Morisada, K. Ushioda, H. Fujii, "Formation Mechanism of Joint Interface in Cold Spot Joining Method and Its Joint Properties", ISIJ int., 65(2025), 676-687. (Award-winning paper) doi

Research Division of Materials Joining Mechanism, Dep. of Composite Materials Processing

Research summary

From a viewpoint of the energy saving and environmental problem solutions, the research fields of this department focus on both of the effective reuse of resources and energy including renewable ones and reduction of life hazardous materials and air pollutions. In particular, by controlling the interfacial mechanics and high-performance of materials, atomic/nano-scale composite materials and processing designs for the environmentally benign are established, and applied to innovative industrial development.

Research subjects

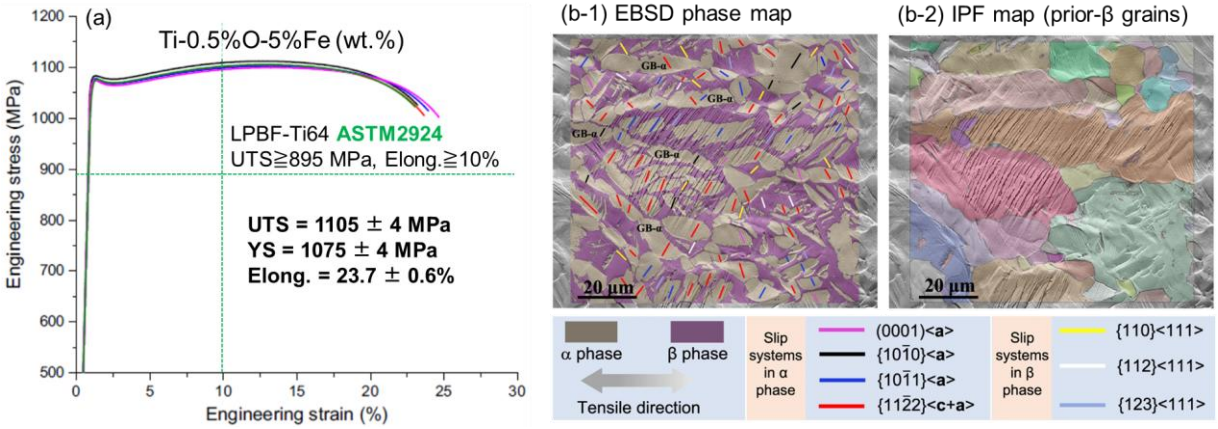
(1) Powder based titanium materials with static and dynamic high-strength & ductility

(2) Core-shell structured Ti-N composite powders via solid-gas reaction

(3) Laser powder bed fusion titanium alloys strengthened by solid-solution and nano-dispersoids

(4) Nano-carbon materials reinforced metal matrix composites via local interface mechanics

(5) Direct bonding of plastic materials to metals by molecular structure and fine bubbles control



(a) Engineering stress-strain curves of PBF-LB α+β Ti-0.5O-5Fe alloy after annealing at 800 °C for 1 h. The mechanical properties shown in the inset are derived from five independent stress-strain curves.
(b) Dislocation activity in Ti-0.5O-5Fe alloy during tensile deformation. (b-1) SEM image superimposed with the corresponding EBSD phase map, obtained at 10.1% uniform elongation through in-situ SEM uniaxial tensile tests. Multiple slip systems are active, with {11-22}<c+a> (red) being predominant. (b-2) Overlaying IPF maps of prior-β grains with SEM images reveals numerous slip traces traversing prior-β GBs, confirming that GB-α does not hinder slip transfer.

Major Papers

Y. Yang, X. Wang, B. Chen, S. Lu, K. Liu, S. Kariya, X. Shi, X. Liao, K. Kondoh, M. Qian, J. Shen, "Oxygen-mediated high uniform plasticity in α-β titanium alloys", Nature Commun., 16 (2025) 10833. doi

Y. Yang, B. Chen, K. Kondoh, J. Shen, "Water quenching enhances ductility of titanium alloys with ultra-high interstitial solutes", Scrip. Mater., 274 (2026) 117144. doi

T. Teramae, A. Issariyapat, A. Bahador, J. Umeda, K. Kondoh, "Strength enhancement of α + β dual phase Ti-4Fe alloys with rhenium addition at room and high temperatures", Mater. Design, 256 (2025) 114278. doi

L. Liu, S. Li, S. Li, H. Liu, S. Wang, D. Hui, X. Zhang, S. Kariya, A. Issariyapat, J. Umeda, K. Kondoh, B. Xiao, Z. Ma, "Microstructure and mechanical properties of nano TiB whisker-reinforced titanium matrix composites using atomized Ti–TiB composite powder as raw materials", Compos. Pt. B-Eng., 298 (2025) 112392. doi

K. Kondoh, N. Nishimura, K. Shitara, S. Kariya, K. Chen, A. Sani, J. Umeda, "Mechanistic insight into cooling-rate-driven bubble evolution and interfacial bonding strength in directly bonded Ti–PET materials", J. Adv. Joining Proc., 12 (2025) 100345. doi

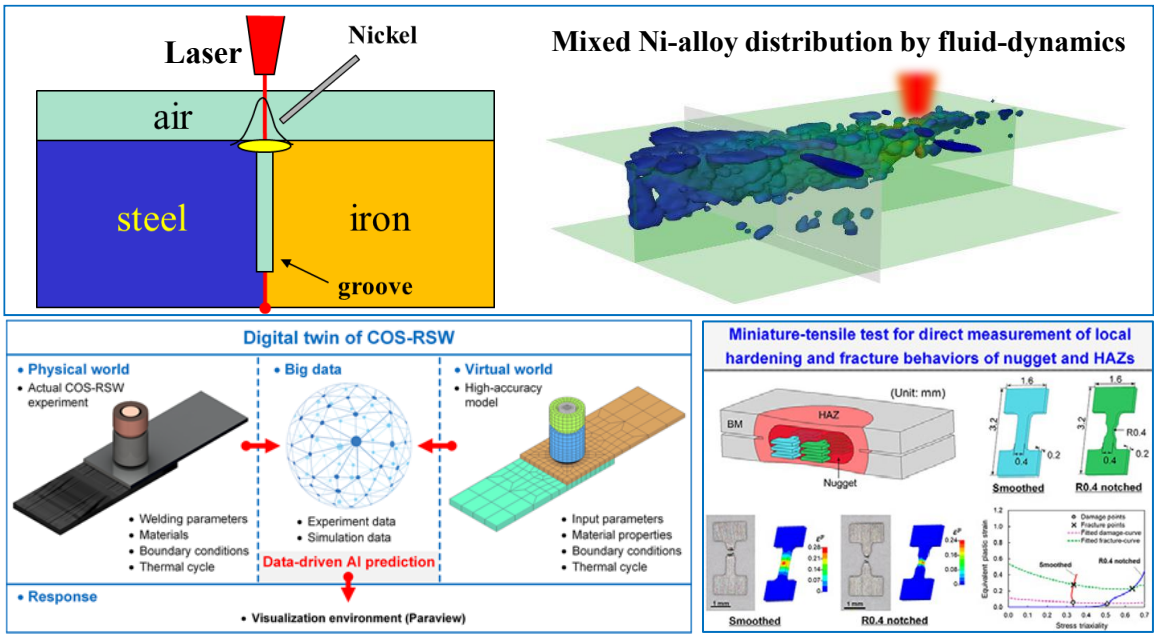
Research Division of Materials Joining Assessment, Dep. of Joining Mechanics and Analyses

Research summary

Numerical modelling is a basis of the Artificial Intelligent (AI) and one of the most efficient approaches to look into various detail phenomena involved in joining & welding & additive manufacturing processes & structure sensing. In addition, assessment to residual stress/strain and strength of various types of joints between dissimilar materials is being studied through both the advanced measuring technology and numerical computational approaches.

Research subjects

(1) Numerical analysis of nonlinear thermal fluid-dynamics, mechanical and metallurgical phenomena in multi-materials additive manufacturing, fusion welding and solid-state joining.
(2) Artificial Intelligent (AI) and digital twin for full manufacturing processes including metal forming, joining, welding and assembling of structures.



Major Papers

R. Zhang, D. Nishimoto, N. Ma, F. Lu, T. Suga, T. Tabuchi, S. Shimada, "Numerical modelling of laser welding pool thermal-dynamics and dissimilar materials mixing of cast-iron, carbon-steel and nickel-alloy wire for weld crack prevention", J. Manuf. Process., 156 (2025) 398–410. doi

W. Li, N. Ma, P. Geng, "Interpretable data-driven modeling of process, microstructure, strength relationship in hot-press joining of aluminum and CFRTP", Compos. Struct., 374 (2025.12.15) 119716, 1-18. doi

J. Wang, N. Ma, D. Deng, "Progress in welding distortion prediction and control technology for advanced manufacturing", J. Manuf. Process., 152 (2025) 1012–1036, doi

Y. Ohnishi, K. Sato, Ninshu Ma, K. Narasaki, Li Weihao, K. Yasuda, "Analysis of Residual Stress in Arc Welded Lap Joints of High Strength Steel Sheets and Welding Wire Using Material Properties during Heating and Cooling" SAE Tech. Paper, 2025-01-8313 (2025). doi

N. Xiao, H. Kong, Q. Sun and N. Ma, "Comprehensive Evaluation of Double-Wire Narrow Gap GMAW Process and Dissimilar Joint for Chute Structure", J. Mater. Eng. Perform., (2025), 1-14. doi

Research Division of Materials Joining Assessment, Dep. of Joining Design and Structuring

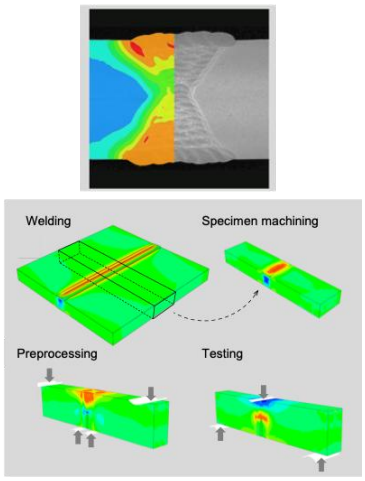
Research summary

In this research division, the structural design and fabrication processes are considered in the following two aspects: the "through-process" and "trans-scale." The concept of "through-process" considers the time axis throughout the life cycle, from the design and construction process, such as welding and joining, to testing, service, repair, reinforcement, and maintenance. The concept of "trans-scale" considers spatial axes ranging from micro to macro, such as the microstructure of materials of welds, welding and joining components, and structures.

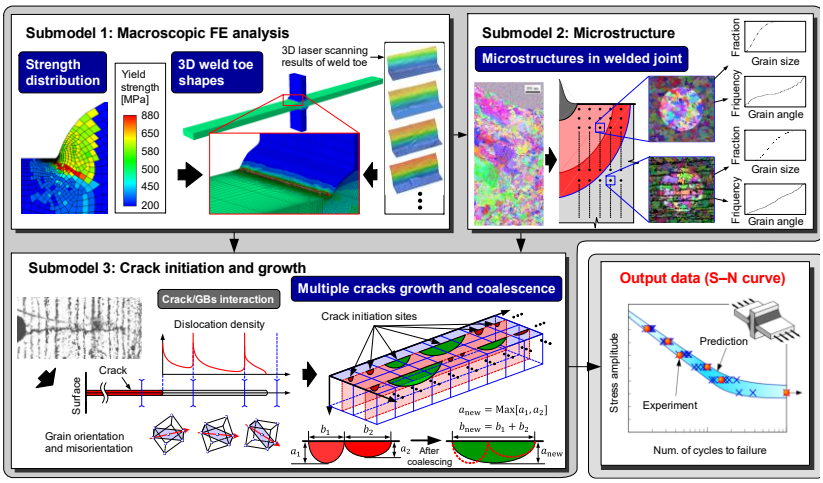
We research the evaluation of the performance and reliability of various structures at each of these stages and scales. In particular, the effects of thermal processing, represented by residual stresses and deformations, on the performance of welded and joined components and structures will be clarified from microscopic and macroscopic perspectives. Based on these findings, we will also develop a detailed and intelligent evaluation method. We aim to establish design engineering that contributes to advancing structuring processes such as welding and joining.

Research subjects

(1) Development of evaluation methods for strength properties and reliability of structural members, welds and joints
(2) Development of performance evaluation technique for welded structures in consideration of residual stress
(3) Development of manufacturing process simulation technology for design applications
(4) Development of damage evaluation method considering microscopic plastic deformation behavior of materials and welds
(5) Evaluation of cracking characteristics considering the heterogeneity of structural materials and weld



Through-process simulation of specimen machining, residual stress modification, and fracture toughness testing.



Evaluation of Fatigue Properties of Structural Materials and Weldments by Multiscale Modeling

Major Papers

W. Chi, W. Wang, H. Zhou, R. Yan, Y. Mikami," Multiscale Modelling of Additively Manufactured Ti-6Al-4V Alloy: Fatigue Performance Evaluation from Material to Structural Level", Int. J. Fatigue, 201(2025) 109181. doi

Research Division of Materials Joining Assessment, Dep. of Joining Metallurgical Evaluation

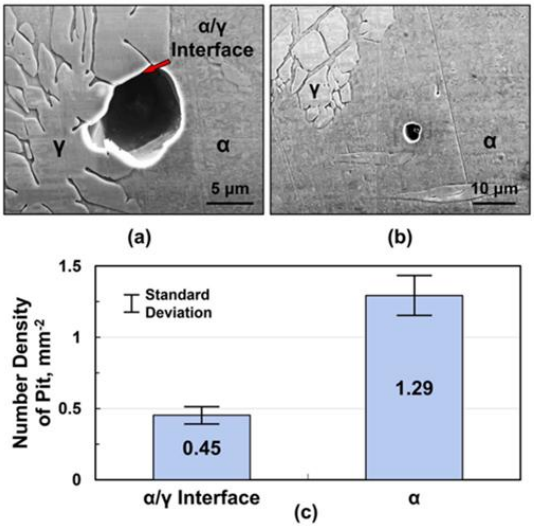
Research summary

Welding and joining technologies are required to achieve the high-performance properties of materials, which are essential for manufacturing industrial products and structures. There is a demand for innovative welding and joining technologies that can be applied to similar and dissimilar materials.

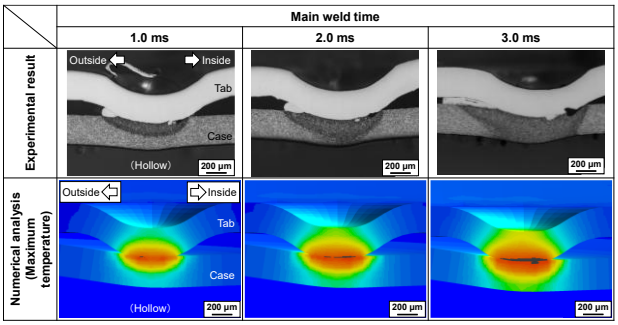
The Department of Joining Metallurgical Evaluation researches to improve the properties and reliability of welding joints when welding similar or dissimilar materials using high-performance materials, with a focus on fusion welding and solid-state joining. Our department elucidates the governing mechanisms in the formation process of welds and research to develop new welding technologies that can control the properties of weld joints.

Research subjects

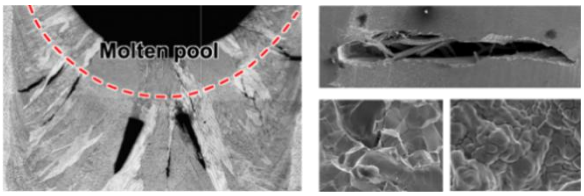
(1) Development of resistance welding technology for advanced sheet materials.
(2) Analysis of weld interface structure of dissimilar welded joints.
(3) Microstructural evolution during solidification and solid state in welds.
(4) Hot cracking during welding and additive manufacturing process and the prediction technology.
(5) Improvement of mechanical and corrosion properties of welds of stainless steels and Ni-based alloy by microstructure control.



Observation of pitting initiation in heat-affected zone by FESEM
(a) α / γ Interface and (b) α -ferrite, (c)Location of pitting



Comparison of cross-sections of the micro-projection dissimilar metal welded joints at different main weld times between experimental and numerically calculated results on the positive electrode side



Evaluation and analysis of hot cracking susceptibility test

Major Papers

K. Kadoi, Y. Nakamori, K. Yamada, T. Osuki, "Relationship between grain boundary characteristic and liquation cracking susceptibility of alloy 625", Mater. Des. 261 (2025), 115400. doi

Y. Hou, K. Kadoi, "Nucleation of equiaxed δ-ferrite grain by Oxide + TiN to improve tensile properties of ferritic stainless steel welds", Mater. Charact. 227 (2025), 115270. doi

T. Yamamoto, Y. Ogawa, M. Hayashi, K. Kadoi, D. Shiozawa, T. Sakagami, "Estimation of Fatigue Limit for Aluminum Alloy Laser Welds Based on Dissipated Energy", Exp. Mech. 65 (2025), 385-395. doi

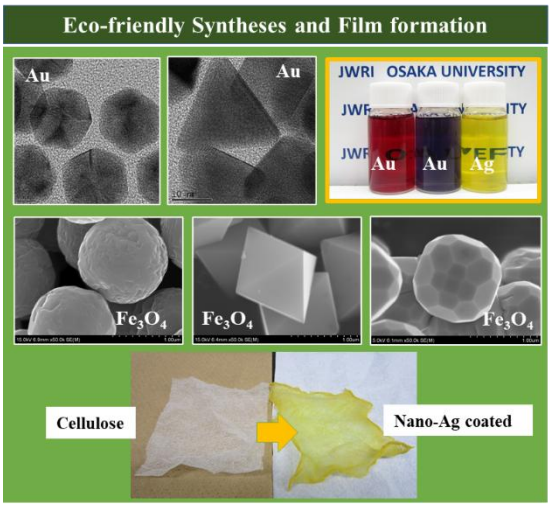
Research Center for Additive Joining Application, Dep. of Green Additive Manufacturing

Research summary

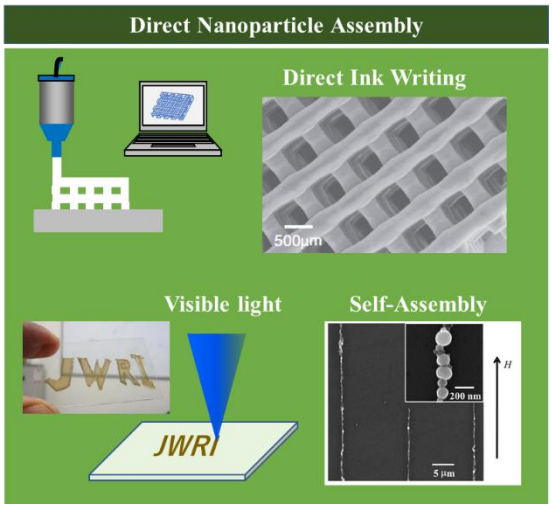
As environmental and energy problems become more serious on a global scale, we are working on research and development of material process technologies and environment-friendly materials that will greatly reduce the environmental load. We recently focus on inorganic nano- and micro-particles as building blocks for functional materials and devices, and we develop low-environmental load methodologies for their syntheses, film formation, bonding, integration, and 3D printing. Furthermore, we are proceeding with research and development of environment and energy related materials and devices using our new process technology.

Research subjects

(1) Eco-friendly solution-based syntheses of nano- and micro-particles
(2) Eco-friendly assemblies of nano- and micro-particles
(3) Development of Environment friendly materials
(4) Development of environmental monitoring devices



(Top) Reductant free synthesis of noble metal nanoparticles (NPs)
(Middle) Shape-controlled synthesis without any additives
(Bottom) Reductant-free coating of noble metal NPs



(Top) Direct Ink Writing of Nanoparticle-Ink
(Left-bottom) Visible-light induced patterning of metal NPs
(Right-bottom) Self-assembly of magnetic NPs under magnetic field

Major Papers

C. T. Thanh , N. T. Huyen, V. T. Thu , P. V. Trinh, N. V. Tu, B. H. Thang, T. V. Hau, D. Tuan, M. T. Phuong, P. T. Binh, P. N. Minh , H. Abe, N. V. Chuc, "Improved electrochemical sensor based on 3D porous Gra-DCNTs-AuNPs-PANi hybrid film for fenitrothion detection", Mater. Lett., 386 (2025)138209. doi

N. T. Huyen, L. T. Q. Xuan, T. A. S. Suong, C. T. Thanh, P. V. Trinh, N. V. Tu, N. T. Loan, L. T. Q. Ngan, P. T. Binh, C. T. L. Huong, D. N. Thuan, V. X. Hoa, N. V. Hao, N. V. Quynh, H. Abe and N. V. Chuc, "A novel approach for the fabrication of SERS substrates based on 3D urchin-like TiO2@Gr–AuNPs architecture", RSC Adv., 15 (2025) 15806-15818. doi

Y. Suzuki, H. Abe, "Murataite ceramics – mineral, structure, synthesis and applications: A review", J. Ceram. Soc. Jpn., 133 (2025) 189-196. doi

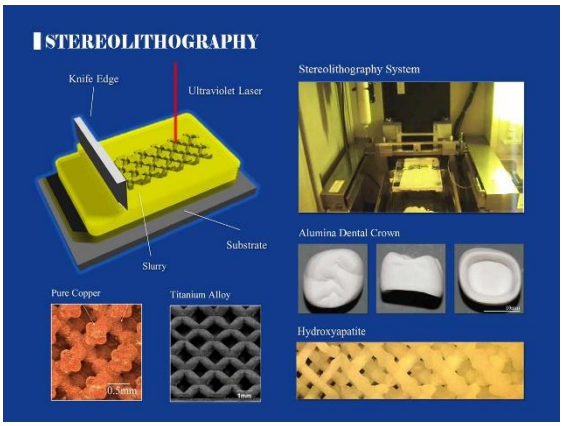
Research Center for Additive Joining Application, Dep. of Lithographic Additive Manufacturing

Research summary

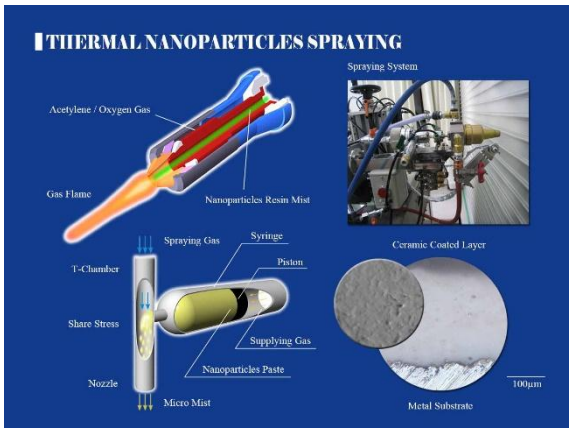
Additive Manufacturing (AM) was newly developed as novel process to create three dimensional (3D) structures through two dimensional (2D) layer laminations. Metal and ceramic nanoparticles were dispersed into resin paste to use for our original process. In lithography techniques, a high power laser beam was scanned on the spread paste for 2D layer drawing and 3D structure forming. In deposition techniques, the paste was introduced into high temperature plasma or gas flame for 2D cladding and 3D patterning. Created electric devices, biological implants and energy modules will contribute to sustainable development.

Research subjects

(1) Stereolithographic Additive Manufacturing of Metal and Ceramic Parts Using Nanoparticles Pastes
(2) Structural Fabrication of Photonic Crystals with Diamond Structures for Terahertz Wave Control
(3) Modulation of Micro Porous Structures in Biological Ceramic Implants for Artificial Metabolism
(4) Manufacturing of Micro Metal Lattices for Effective Controls of Heat Flow and Stress Distributions
(5) Advance Development of Thermal Nanoparticles Spraying for Additive Manufacturing Technique
(6) Fine Separator Formation in Solid Oxide Fuel Cells by Using Thermal Nanoparticles Spraying
(7) Fine Ceramic Coating with Thermal Conductivity and Corrosion Resistance for Heat Exchanger Tubes
(8) Layer Laminations by Fine Particles Spraying and Sintering to Create Functionally Graded Structures



Laser Scanning Stereolithography of Additive Manufacturing to Fabricate Bulky Metal and Ceramic Components with Micro Geometric Patterns



Thermal Spraying Using Fine Particle Pastes to Laminate Metal and Ceramic Coated Layers with Functional Nano/Micro Structures

Major Papers

F. Spirrett, S. Kirihara, "Mechanical Strengthening of Lightweight Metals by Fractal Pattern Surface Modification via Stereolithography", J. Smart Process., 14(6) , (2025), 294-300. doi

K. Yoshihara, N. Nagaoka, F. Spirrett, Y. Maruo,Y. Yoshida, B. V. Meerbeek, S. Kirihara, "Top-Down Stereolithography-Based System for Additive Manufacturing of Zirconia for Dental Applications", Appl. Sci., 15(11), (2025), 6155-6155. doi

F. Spirrett, S. Kirihara, "Structural Control by Stereolithography Additive Manufacturing and Environmental Material Tectonics", Trans. Indian Ceram. Soc. 84(1), (2025), 64-74. doi

Research Center for Additive Joining Application, Dep. of Additive Manufacturing Mechanism

Research summary

Laser powder bed fusion (L-PBF), one of additive manufacturing technologies, is based on a rapid solidification process, and enables to form ultra-fine microstructures and supersaturated solution of metal materials, which are effective to improve mechanical properties. This department focuses on clarification of both unique microstructures formation mechanism and their effect on the strength and ductility balance of L-PBF titanium alloys.

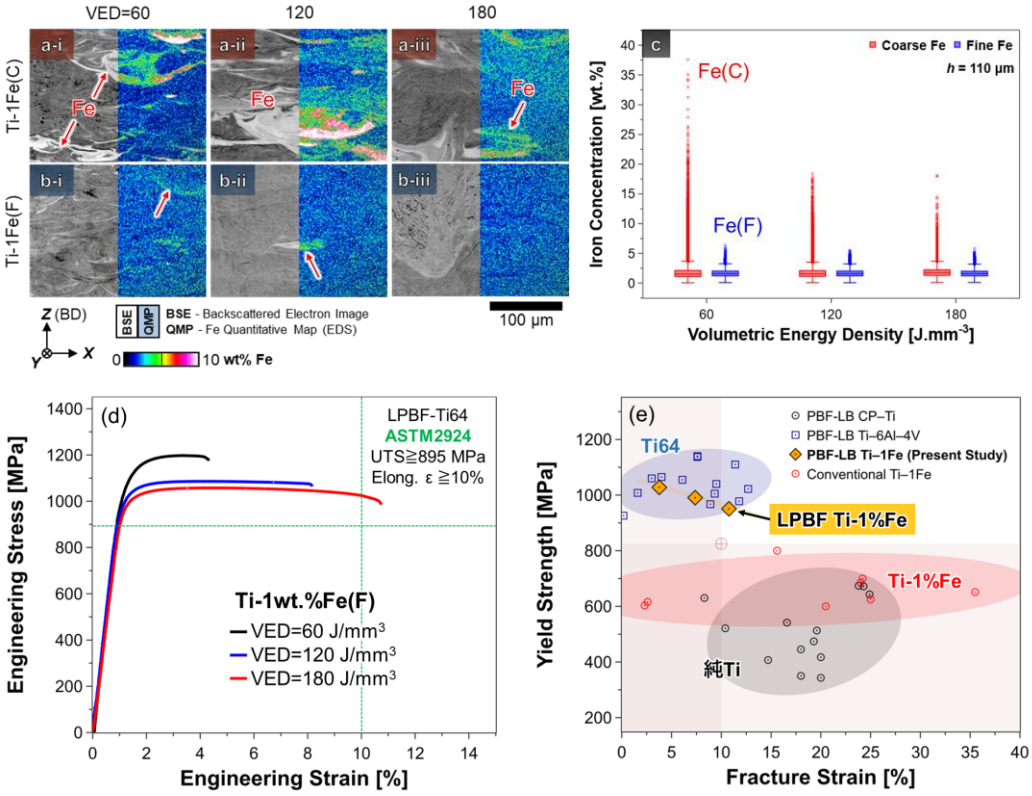
Research subjects

(1) Formation mechanism of unique fine microstructures and orientations of L-PBF Ti alloys

(2) High-strengthen metal matrix composites fabricated by L-PBF process

(3) Strengthening mechanism of L-PBF Ti alloys – grain refining, solid solution and dispersions

(4) In-situ alloying process control in L-PBF Ti alloy fabrication using pre-mixed powders



Heterogeneities in the *X-Z* microstructures of Ti-1%Fe built from pre-mixed feedstock prepared from (a) coarse Fe and (b) fine Fe powders, as observed by BEI (left half) and Fe EDS quantitative mapping (right half). (c) Distributions of local Fe concentrations from EDS data from the same samples, evaluated over scanning areas of 2.4 mm x 1.8 mm. (d) Engineering stress-strain and (e) Comparison of YS and fracture strains of the samples prepared in the present and previous studies.

Major Papers

J. Huang, A. Issariyapat, S. Kariya, J. Umeda, K. Kondoh, "On the viability of in-situ alloyed Ti-1Fe as a strong and ductile alternative to Ti-6Al-4V for laser-based powder bed fusion", Addit. Manuf., 105 5 (2025) 104788. doi

K. Liu, J. Li, J. Shen, A. Issariyapat, K. Kondoh, W. Huo, B. Chen, "Tuning the size of TiC plates in additive manufactured titanium matrix composites by laser heat input and its effect on strengthening effect", Mater. Charact., 225 (2025) 115212. doi

D. Xu, W. Yang, M. Yan, M. P. Behera, S. Singamneni, M. A. Hodgson, Y. Yang, K. Kondoh, P. Cao, "Unlocking strength-ductility synergy in laser additive manufacturing of Ti-Cu alloys via core-shell feedstock design", Mater. Sci. Eng. A, 946 (2025) 149138. doi

Research Center for Additive Joining Application, Dep. of Laser Additive Manufacturing

Research summary

In this department, fundamental studies on laser additive manufacturing (LAM) are performed and apparatuses for LAM are developed.

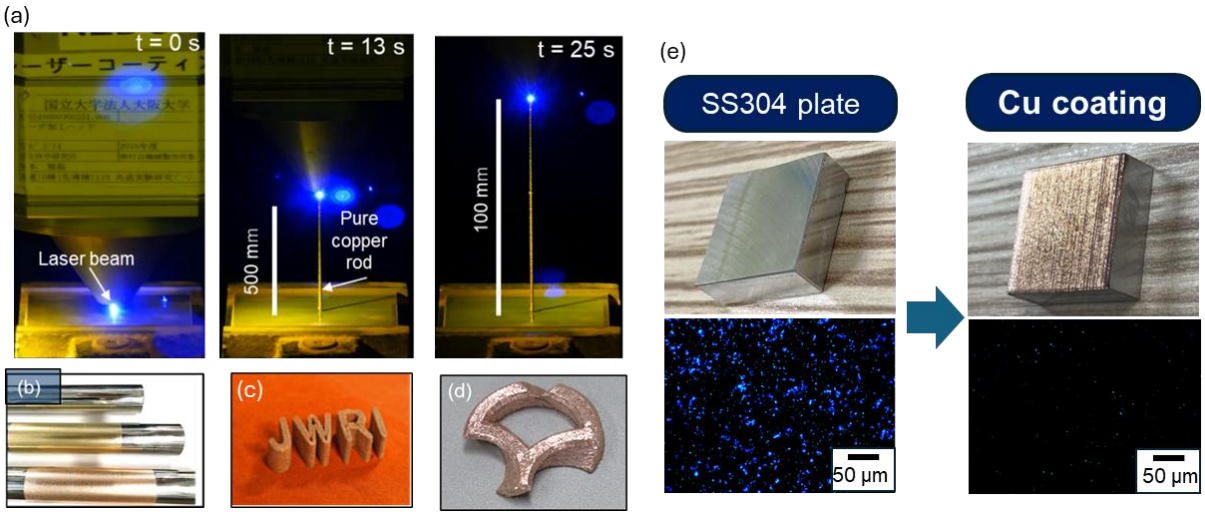
In particular, the apparatuses installed with high power blue diode lasers are also developed since those lasers enable stable and high efficient melting of metal materials such as copper.

Furthermore, in order to realize high-quality and high-speed LAM, we will experimentally and theoretically proceed with the analysis of the melting and solidification process of the material by laser irradiation.

Utilizing the obtained knowledge, we will work on the creation of innovative LAM processes and the development of equipment and promote their social implementation.

Research subjects

(1) Development of additive manufacturing technologies with blue diode laser
(2) Elucidation of laser interaction with metal powders for LAM
(3) Creation of new function by laser metal deposition
(4) Elucidation of melting and solidification phenomena in LAM process



Additive manufacturing of copper using blue diode laser (a)3D rod formation (b) Micro-coating of copper alloy (c) JWRI logo by L-PBF (d) Osaka University's school emblem by L-PBF (e) Antimicrobial effect of the pure copper coating by DED against S.aureus.

Major Papers

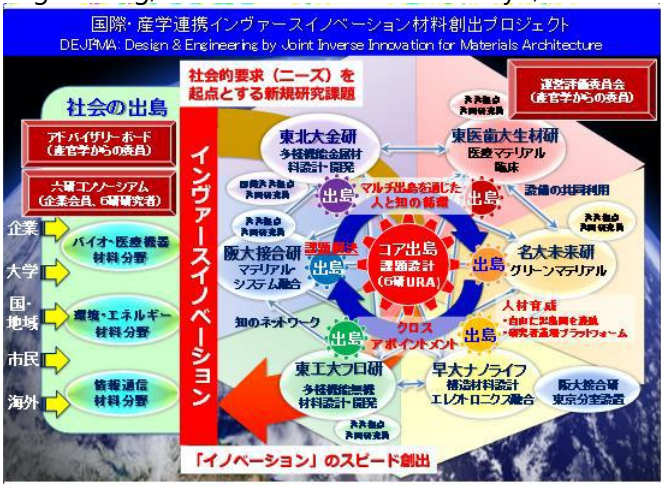
B. Chayasombat, S. Srisawadi, D. Tanprayoon, P. Promoppatum, K. Tapracharoen, Y. Sato, T. Suga, M. Tsukamoto & O. L. A. Harrysson, "Influence of TiC addition on the microstructures of TiC/IN718 composites fabricated by blue diode laser additive manufacturing", Int. J. Adv. Manuf. Technol., 141(3), (2025), 2277-2287. doi

Y. Yamashita, S. Kamo, Y. Sato, K. Takenaka, T. Ohkubo & M. Tsukamoto, "Laser-assisted substrate heating for crack mitigation in laser metal deposition", Appl. Phys. A-Mater. Sci. Process., 131(12), (2025), 1-9. doi

Strategy Office for Promotion of Inter-Institute Collaborations

Research summary

"Strategy Office for Promotion of Inter-Institute Collaborations" has been established in JWRI as the headquarter to carry out the Project "Development of Inter-Institute Collaborations of 6 Research Institutes from 5 Universities for Strengthening Material Innovation Force", which has been supported by the Ministry of Education, Culture, Sports, Science and Technology since 2022. Through promotion of the inter-institute collaborations of the 6 research institutes from the 5 Universities (Joining and Welding Research Institute, Osaka University, Institute for Materials Research, Tohoku University, Institute of Integrated Research/Materials and Structures Laboratory, Institute of Science Tokyo, Institute of Materials and Systems for Sustainability, Nagoya University, Institute of Integrated Research/Laboratory of Biomaterials and Bioengineering, Institute of Science Tokyo, Research Organization for Nano & Life Innovation, Waseda University), the project has been carried out for acceleration of the problem-solving and the creation of innovations, which are based on social demands, and thus for strengthening material innovation force. The related research project "Design & Engineering by Joint Inverse Innovation for Materials Architecture (DEJ^{2}MA Project)" has been carried out through the inter-institute cooperative research activities.



Research subjects

(1) Environmental and Energy Materials
(2) Biomedical and Healthcare Materials
(3) Information and Communication Material

Major Papers

T. Kozawa, R. Fujiwara, K. Fukuyama, K. Yoshida, S. Usuki, M. Kawashita, K. Hoshino, S. Ota, H. Abe, "Magnetic Macroporous Microspheres from $FeCO_3$ via Water Vapor-Mediated Thermal Decomposition: Implications for Nanoparticle Capture and Biomedical Applications", ACS Appl. Nano Mater., 8 (2025) 18781–18789. doi

M. Jiang, K. Nozaki, T. Mokudai, Y. Nakano, M. Uo, K. Yamashita, S. Ohara, N. Wakabayashi, "Enhancing the Photocatalytic Activity and Antibacterial Efficiency of TiO2 Nanosheets via Doping with Ag, Cu, or Ce", ACS Appl. Nano Mater., 8(2025) 11568–11581. doi

R.-V. Canton, Y. Matsunaga, S. Zhang, M. Xue, M. Osada and R. Kitaura, "Covalent functionalization of transition metal dichalcogenides with perylene for light harvesting devices", Nanoscale, 17 (2025) 8084-8100. doi

Joint Interface Microstructure Characterization Room

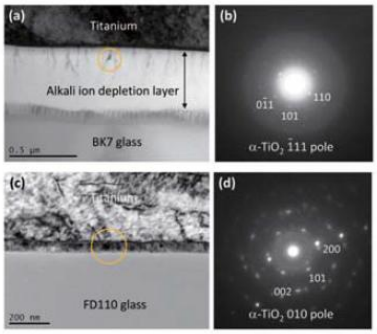
Research summary

In order to clarify the effect of material structure on the properties of joints joined by various methods and materials, microstructures of the joints are examined using a transmission electron microscope (TEM). TEM observation provides various information such as the crystal structure, chemical composition, and distribution of precipitates, inclusions, and lattice defects in minute areas. We also support the preparation of specimens for TEM observation from targeted areas in joint structures that are difficult to process, using various means such as focused ion beam (FIB) processing. In addition to TEM sample preparation, we develop methods for micromechanical testing of materials using FIB processing and apply them to strength evaluation of joint structures.

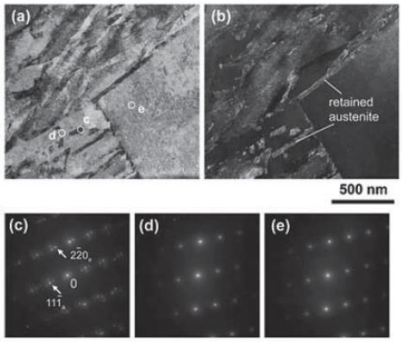
As a unique activity of the analysis room, we perform basic study on the bonding mechanism of anodic bonding, which is a method of bonding glass to conductors at relatively low temperatures, and develop new bonding methods and high-function bonding interfaces by applying that knowledges.

Research subjects

(1) Microstructural analysis of various bonding interfaces and material structures
(2) Fundamental research on the anodic bonding process of glass to various conductors
(3) High functionalize of glass-to-glass anodic bonding interfaces
(4) Development of new bonding methods that applies the principle of anodic bonding



Reaction products that grew at joint interfaces between titanium and optical glasses. The bright-fi eld image of BK7 crown glass/titanium joint interface by transmission electron microscopy (a), Selected Area electron Diff raction (SAD) pattern taken from the area indicated by a circle in the image a (b), bright-field image of FD110 dense flint glass/titanium joint interface (c), and SAD pattern taken from the area indicated by a circle in the image c (d). These reaction products were found to consist of α-TiO2 . However, those forms are strongly aff ected by types of glass.



Distribution of retained austenite in 980 MPa high-tensile steel. (a) Bright-field image, (b) dark-field image taken by 111 reflection from austenite indicated in the diff raction pattern in (c), and (c)-(e) selected-area electron diff raction patterns taken from positions indicated in the bright -fi eld image in (a). Austenite appears bright between ferrite laths in the dark-fi eld image.

Major Papers

M. Takahashi, "Lap Anodic Bonding of Dissimilar Glasses by Lowering the Bonding Temperature", 31th Symposium on Microjoining and Assembly Technology in Electronics, held on 28-29 January in Yokohama, Japan,(2025), 161

M. Wahba, S. M. I. Shamsah, M. A. H. Gepreel, M. Takahashi "High-power ultrasonic spot welding of copper to type 304L austenitic stainless steel", Welding in the World., 69, (2025), 555 doi

Global Diversity and Inclusion Promotion Office

Summary

Global D&I (Diversity & Inclusion) Promotion Office promotes the development of an environment that maximizes the strengths of Joining and Welding Research Institute (JWRI) and all members by truly embracing diversity and respecting the individuality of each person, regardless of gender, nationality, age, cultural background, etc., in order to achieve the SDGs, which aim to realize a society where "no one is left behind". In response to the trend toward internationalization in academic research, JWRI will develop international joint industry-academia research based on the international network we have established to date. JWRI aims to develop competent human resources to face global challenges, to strive to stimulate innovation in joining science as the world-leading research in the field of welding and joining, and to realize the institute where diverse human resources can play an active role.

In FY 2025, as part of our global diversification activities, the main initiatives include the implementation of a training program in Japan for faculty members of Hanoi University of Science and Technology (HUST); the organization of the Vietnam Welding Research Club meetings (three sessions in total), which function as a platform for industry–academia collaboration for HUST-UOsaka; the delivery of training courses and certification examinations for Welding Coordinator in Vietnam, under the JICA Grassroots Technical Cooperation Project; and the implementation of Coupling Internships as part of global human resource development efforts, funded by The University of Osaka Master Plan Promotion Project (August in USA, and September in Vietnam).

Another activity was focused on diversifying human resources with regards to gender and global perspective in order to enhance outcomes for further diversity and inclusion within JWRI.

Activities

(1) Increase Global Diversification: Strengthen International Collaboration Research; Operation of "Joining and Welding Research Institute HUST-UOsaka"; Create and activate foundation of International Industry-Academia Collaboration; Increase number and quality of Welding Engineers in Vietnam and in Southeast Asia; Strengthening research collaborations with oversea institutes through various schemes; Foster friendly work environment at JWRI.

(2) Increase Gender Diversification: Bring together students, faculty and staff from different roles and positions; open the Japanese language designed for daily life at laboratories.

Table.1. List of activities and projects for Global Diversification (Extracted)

Name	Contents
Training Program for lectures from HUST in Japan funded by JICA	To enhance the capacity of education and research for the lectures at HUST, we organized one-week-training in Japan during the summer 2025, visited Kansai Expo, TOA Kogyo, learned technical knowledge at Uosaka, & more.
Vietnam Welding Research Club	1) May 29th, 2025 in Hanoi 2) November 27th, 2025 in Hanoi
Welding Coordinator Training & Exam (Funded partially by JICA)	Training and Exam in Vietnam held November 25-29, 2025. (Certified by Japan Welding Engineering Society)
Coupling Internship (CIS)	Aug: USA (Daihen Inc., Ohio State Univ.) / Sep: Vietnam (IIA, HUST)
JST Sakura Science Exchange Program	Invited 2 students during Nov.26-Dec.16, 2025: 2 from China (Shanghai Giao Tong University and Tsinghua University)
CJLC Blended Japanese Course @JWRI	Japanese for Daily Life in OU Science Labs in July-Sep. 2025, and Nov.2025-Feb.2026.

Welding Club: Seminar

Training in Japan

CIS

Japanese Course

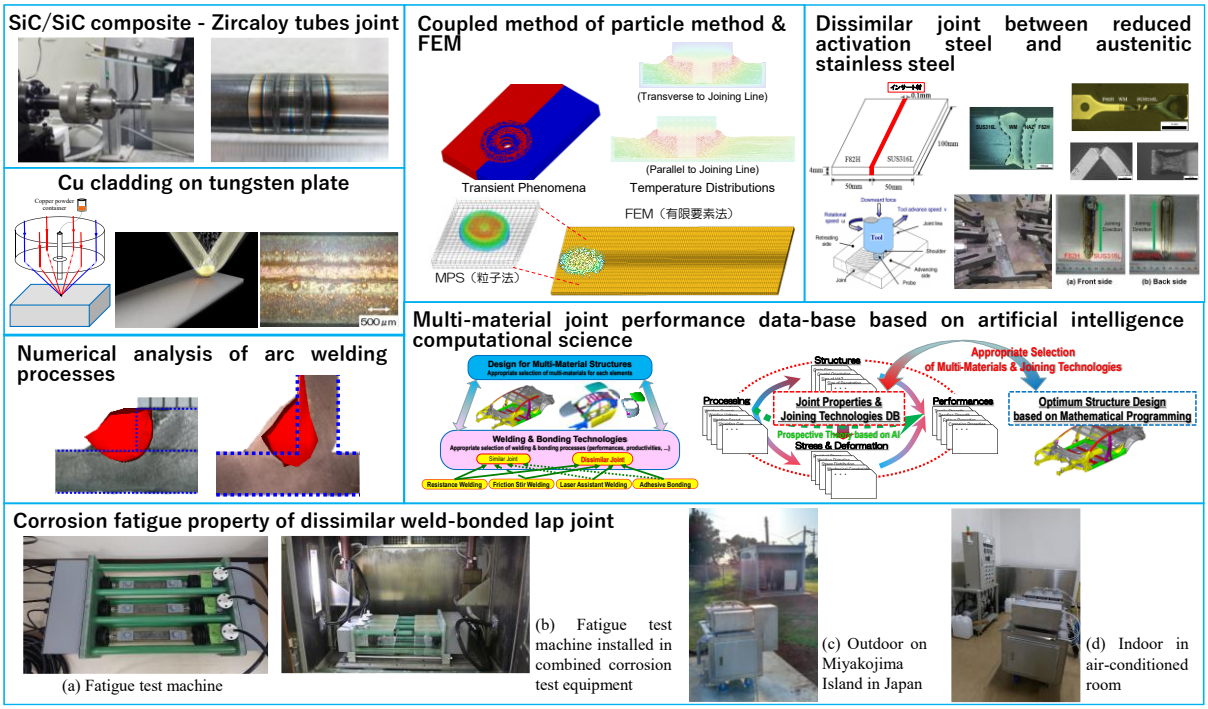
New Normal Manufacturing Consortium Office

Research summary

New Normal Manufacturing Consortium Office deals with not only basic researches for generating advanced materials but also developments & educations of their applied technologies in order to establish Material Innovation Strategy. As for the creation of advanced materials, new high-functional (environmentally) adaptive materials is developed by using the advanced processing technologies. In addition, in order to achieve "Carbon Neural 2050", optimum structural design is studied through the appropriate selection of multi-materials and joining technologies with the aid of Artificial Intelligence computational science.

Research subjects

(1) Development of advanced dissimilar materials joint technology by using high brightness laser beams
(2) Computational analysis of friction stir processes by using coupled method between particle method and finite element method
(3) Numerical analysis of arc welding processes by using three-dimensional, non-stationary thermal model
(4) Creation of advanced joining technologies for innovative fusion reactor power generation system
(5) Development of dissimilar materials joint performance data-base based on artificial intelligence computational science



Major Papers

Y. Xia, F. Miyasaka, H. Serizawa and H. Mori, "Effects of Cooling Rate and Nitrogen Content on Morphologies and Precipitation of Widmanstätten Austenite in Welds of Duplex Stainless Steel", TMS2025 154th Annual Meeting & Exhibition Supplemental Proceedings, (2025), pp.1373-1382. doi

R. Shotri, G. Masuno, M. Mori, Y. Morisada, K. Ushioda, H. Serizawa and H. Fujii, "Investigating Novel Forging Mechanisms for Thin Dissimilar Copper-Aluminum Rod Weldments via Pressure-Controlled Joule-Heating and Interfacial Deformation", J. Mater. Process. Technol., Vol.343 (2025), 118992. doi

R. Shotri, Y. Morisada, K. Ushioda, H. Serizawa and H. Fujii, "Immiscible Cu-SS304 Thin Tube Forge Welding via Novel PJFW Process", Int. J. Mech. Sci., Vol.305 (2025), 110780. doi

Osaka Fuji "Advanced Functional Processing" Joint Research Chairs

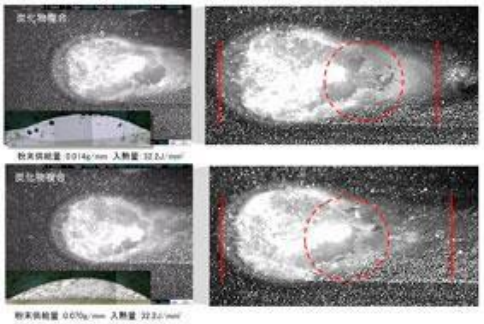
Research summary

This research chair aims to develop advanced functional processing technics by combining laser processing technology and materials knowledge in JWRI and advanced functional manufacturing technologies of Osaka Fuji Corporation.

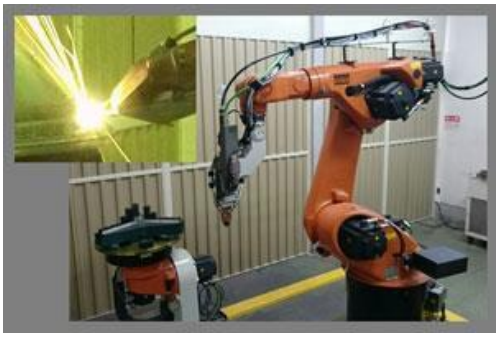
The main purpose is to develop the surface functioning of various materials by laser cladding method, low weldability materials. Finally, these fruits are applied to the next generation of manufacturing technology for various industrial fields.

Research subjects

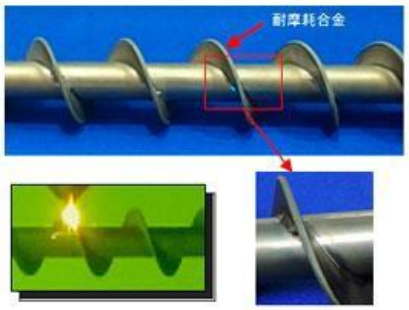
(1) Development of highly functional surface by laser cladding
(2) Development of functional surfaces of small or thin parts
(3) Development of hybrid technology of laser and conventional surfacing technologies
(4) Fundamental research of laser additive manufacturing technology



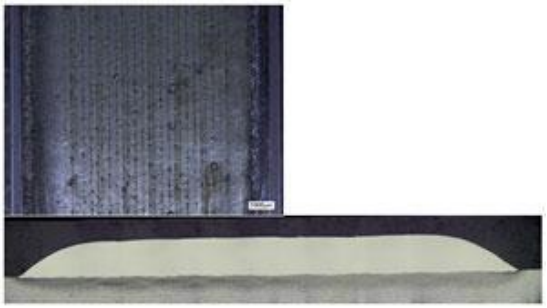
Dynamic observation of molten pool behavior for analysis of blow halls formation using high-speed camera



Experimental apparatus for laser cladding



Example of laser cladding on edge of screw



Wide, flat cladding layer which was provided by beam control

CONTRIBUTIONS TO OTHER ORGANIZATIONS

(January 2025 ~ December 2025)

[Physics, Processes, Instruments & Measurements]

S. SHIGEMATSU, H. KOMEN, M. TANAKA, T. MURATA and A. MURATA
Development of a Milli-Scale WAAM Method Using Constricted Gas Tungsten Arc
Weld. Lett., 43, 4 (2025), 1WL-4WL.

T. METHONG and H. KOMEN
Weld Quality Improvement Using GMAW-GTAW Hybrid Welding Process for Aluminum Alloy
Int. J. Adv. Manuf. Technol., 136 (2025), 4611-4621.

D. WU, H. KOMEN, Y. ASAI, M. TANAKA, T. MURATA and A. MURATA
Element Mixing in Micro GTA Lap Joining of Al and Cu Foils
Weld. World, 69 (2025), 2669-2680.

X. XIAO, C. ZHANG, S. BAI, D. WU, H. KOMEN, K. ZHANG, S. UCHIDA and M. TANAK
Volatile Alloying Elements Modulate Laser-Induced Arc Stability: A Material-Dependent Interaction Mechanism
J. Mater. Res. Technol-JMRT, 38 (2025), 1643-1650.

K. AOYAMA, H. KOMEN, M. TANAKA, K. KONISHI, K. TANIGUCHI and S. IGI
Investigation of the Meandering Bead Formation Process in Metal Inert Gas Welding
Weld. World, (2025).

M. MIWA, H. KOMEN, M. TANAKA, Y. TANABE, Y. MATSUO, K. HYOMA and K. INOSE
Particle Method Simulation of Blowhole Forming Process during Gas Metal Arc Welding
ISIJ Int., (2025), ISIJINT-2025-172.

D.-K. LE, S. TASHIRO, B. XU, A.-B. MURPHY, Q.-N. TRINH, V.-H. BUI, T. YUJI, S.-B. MAMAT, K. YAMANAKA, M. TANAKA and L. XIAO
Effects of Longitudinal External Magnetic Field on Metal Transfer Behavior and Spatter Formation in CO_2 Arc Welding
Materials, 18 (2025), 537(24pp).

K.-D. LE, S. TASHIRO, N.-Q. TRINH, T. SUGA, N. SAWAMURA, K. FUKUDA, S. SASAKURA, J.-E. ALVAREZ-ROCHA, P.-F. MENDEZ, A.-B. MURPHY, H.-V. BUI and M. TANAKA
Elucidation of Alkali Element's Role in Optimizing Metal Transfer Behavior in Rutile-Type Flux-Cored Arc Welding
J. Manufacturing Processes, 139 (2025), 105-125.

B. XU, C. ZHANG, G. ZHANG, F. JIANG, S. TASHIRO, M. TANAKA and S. CHEN
Metal Flow Mechanisms during Alternating Current Arc Welding and Additive Manufacturing of Aluminum Alloy
Commun. Mater., 6 (2025), 94.

J. LIU, F. JIANG, S. TASHIRO, S. CHEN and M. TANAKA
A Physics-Informed and Data-Driven Framework for Robotic Welding in Manufacturing
Nat. Commun., 16 (2025), 4807.

S. TASHIRO, N.-Q. TRINH, K.-D. LEA, T. SUGA, S. SASAKURA, K. FUKUDA, A.-B. MURPHY, H.-V. BUI and M. TANAKA
Optimization of Metal Transfer in Rutile Flux-Cored Arc Welding through Controlled CO_2 Concentration in Argon-CO_2 Shielding Gas
IIW Annual Assembly, 2025 (USB), (2025), Doc. XIX-0004-2025.

D.-K. LE, S. TASHIRO, Q.-N. TRINH, T. SUGA, N. SAWAMURA, K. FUKADA, S. SASAKURA, J.-E. ALVAREZ-ROCHA, P. MENDEZ, A.-B. MURPHY, V.-H. BUI and M. TANAKA
Elucidation of Alkali Element's Role in Optimizing Metal Transfer Behaviour in Rutile-Type Flux-Cored Arc Welding
IIW Annual Assembly, 2025 (USB), (2025), Doc. XIX-0002-2025.

X. WANG, H. HE, H. XU, S. TASHIRO and M. TANAKA
Achieving Deep Penetration Welding of Nitrogen-Containing Stainless Steel Using Two-GTA Doped with Oxygen and Nitrogen
J. Manufacturing Processes, 153 (2025), 82-98.

V.-H. BUI, Q.-N. TRINH, D.-K. LE, S. TASHIRO, L.-D. HAN, H.-L. PHAN, A.-B. MURPHY, K. YAMANAKA, M. TANAKA and L. XIAO
Effect of External Magnetic Field on Arc Characteristics and Weld Bead Formation in Metal-Cored Arc Welding
Int. J. Adv. Manuf. Technol., (2025).

B. XU, B. XIAO, F. JIANG, Y. HAN, G. LI, Z. SUN, S. TASHIRO, M. TANAKA and S. CHEN
Dual-Bifurcation Model and Numerical Analysis of Driving Forces on the Keyhole Boundary in Variable Polarity Plasma Arc Welding
Crystals, 16, 1 (2025), 3.

M. OZAWA, H. MATUI and Y. SETSUHARA
Microstructure and Surface/interface Characterization of TiO_2-pillared Mica for Photocatalytic Acetaldehyde Degradation
Hybrid Adv., 10 (2025), 100435.

S. KAKUTA, K. TAKENAKA, M. TAKAHASHI, Y. SETSUHARA and T. OKADA
Photocatalytic Decomposition of Methylene Blue Using a Zinc-Tungsten Oxide Compound Prepared by Co-Sputtering and Calcination
Jpn. J. Appl. Phys., 64 (2025), 04SP07/1-04SP07/5.

K. TAKENAKA, T. NAGATA, K. OTA, Y. SETSUHARA and T. OHTA
Low-temperature Deposition of Crystalline IGZO Films Using High-Power Pulsed Magnetron Sputtering
J. Appl. Phys., 138 (2025), 085302/1-085302/8.

K. TAKENAKA, R. KOYARI, S. SHIGEMORI, G. UCHIDA and Y. SETSUHARA
Effect of Atmospheric Pressure Non-Equilibrium Plasma Pre-Treatment on Adhesive Bonding of SPFC980Y and Polyethylene / Polypropylene
Plasma Processes and Polymers, 22, 10 (2025), e70072/1-e70072/9.

K. TAKENAKA, S. NAKAMOTO, M. SHIMABUKURO, A. JINDA, R. KOYARI, S. SHIGEMORI, K. UENO, S. TOKO, G. UCHIDA, M. KAWASHITA and Y. SETSUHARA
Effect of Surface Treatment Using Non-Thermal Atmospheric Pressure Plasma Jet on Dissimilar Material Direct Joining Using Polyetheretherketone
Surf. Interfaces, 79 (2025), 108187/1-108187/9.

S. TOKO, K. TAKENAKA, K. KOGA, M. SHIRATANI, M. OZAWA and Y. SETSUHARA
Effective Use of Molecular Sieves for Methanation with Plasma Catalysis
Jpn. J. Appl. Phys., 64 (2025), 076003.

H. SHIMIZU, H. NISHIKAWA and K. HASHIMOTO
New Insights of Junction Group States Modified by Surface Activation in Interlayer Dielectrics
Jpn. J. Appl. Phys., 64 (2025), 03SP28.

Y. SHEN, Y. TAI, Y. FANG, C. LIU, N. TSOU, F. OUYANG and H. NISHIKAWA
Effect of Thermal Aging on Microstructural and Shear-strength Changes in Sn-3.0Ag-0.5Cu/Sn-58Bi Solder Joint
J. Mater. Sci. -Mater. Electron., 36 (2025), 1183.

H. SHIMIZU, H. NISHIKAWA and K. HASHIMOTO
Low-temperature Cu-Cu Direct Bonding Enabled by New Method of Plasma Activation
J. Vac. Sci. Technol. B, 43 (2025), 52207.

H. TATSUMI, C.-R. KAO and H. NISHIKAWA
Atomistic Behavior of Cu-Cu Solid-State Bonding in Polycrystalline Cu with High-Density Boundaries
Mater. Des., 250 (2025), 113576.

S. ICHIMARU, T. NAKAGAWA, N. NEMOTO, K. SUGANUMA, H. TATSUMI and H. NISHIKAWA
Lead Whisker Growth Characteristics on Satellites in Earth Orbit
Mater., 43 (2025), 102470.

J. LI, Y. SHEN, H. TATSUMI, H. KOTADIA, R. GAO and H. NISHIKAWA
Effect of Copper on Interfacial Reaction and Microstructure of Soldering on Aluminum Substrate
J. Mater. Res. Technol-JMRT, 37 (2025), 3533-3540.

S. ICHIMARU, T. NAKAGAWA, N. NEMOTO, K. SUGANUMA, H. TATSUMI and H. NISHIKAWA
Orbital Validation for Tin Whisker Suppression by Conformal Coating
Microelectronics Reliability, 174 (2025), 115888.

M. TSUKAMOTO
Blue Diode Laser Additive Manufacturing for the Realization of a Carbon-neutral Society
J. Smart Process., 14, 5 (2025), 232-237 (in Japanese).

R. HIGASHINO, Y. SATO, K. TAKENAKA, N. ABE and M. TSUKAMOTO
Dependence of Pure Copper Layer Formation on Substrate Materials in the Multibeam Method Using Blue Diode Laser
Proc. SPIE, 13354 (2025), 1335404-1-1335404-5.

M. NAKATANI, M. MIZUTANI, T. OHKUBO, Y. SATO and M. TSUKAMOTO
Effect of Beam Shaping on Spatter Suppression in Keyhole Welding Using 16kW Disk Laser
Proc. SPIE, 13350 (2025), 133500G-1-133500G-6.

T. KAYAHARA, T. TANABE, Y. SATO, K. TAKENAKA and M. TSUKAMOTO
Effects of Beam Shape Formed by Beam-Splitting Diffractive Optical Element on Keyhole and Molten Pool Behavior in High-Power Laser Welding of Stainless Steel
J. Laser Appl., 37 (2025), 32014.

T. OHKUBO, K. NISHINO, E. MATSUNAGA, T. DINH and Y. SATO
Ten W Class of Stable Solar-Pumped Laser Using a Cone-Shaped Solar Cavity and 0.7 M^2 Fresnel Lens
J. Adv. Comput. Intell. and Intell. Inform., 29, 5 (2025), 1131-1136.

Y. SATO, K. TOMITA, K. TANIGUCHI and M. TSUKAMOTO
Development of Spatter-Suppressed High-Power Laser Beam Welding for Stainless Steel
J. Laser Appl., 37, 4 (2025).

B. CHAYASOMBAT, S. SRISAWADI, D. TANPRAYOON, P. PROMOPPATUM, K. TAPRACHAROEN, Y. SATO, T. SUGA, M. TSUKAMOTO and O.-L.-A. HARRYSSON
Influence of TiC Addition on the Microstructures of TiC/IN718 Composites Fabricated by Blue Diode Laser Additive Manufacturing
Int. J. Adv. Manuf. Technol., 141 (2025), 2277-2287.

Y. YAMASHITA, S. KAMO, Y. SATO, K. TAKENAKA, T. OHKUBO and M. TSUKAMOTO
Laser-assisted Substrate Heating for Crack Mitigation in Laser Metal Deposition
Appl. Phys. A, 131, 12 (2025).

B. TUMMAKE, T. LERTANAN, P. PROMOPPATUM, B. CHAYASOMBAT, S. SRISAWADI, D. TANPRAYOON, K. TAPRACHAROEN, Y. SATO, T. SUGA, M. TSUKAMOTO and O.-L.-A. HARRYSSON
Powder-based Numerical Study of Melt Pool Behaviors for Inconel 718 with TiC Reinforcement Using Laser Powder Bed Fusion Process
Opt. Laser Technol., 194 (2025), 114393.

K. TAKENAKA, Y. SATO and M. TSUKAMOTO
Formation of Periodic Nanostructures for Improving Biocompatibility and an Evaluation Method of Structure Uniformity
Review Laser Eng., 53, 1 (2025), 10-14.

M. SUDO, S. FUJIO, K. KODA, H. SHIRAI, K. TAKENAKA, M. MIZUTANI, T. PASANG, Y. SATO and M. TSUKAMOTO
The Effect of Plume Removal on Welding Efficiency of Pure Copper Using 1.5 kW Blue Diode Laser
Appl. Phys. A, 131, 4 (2025).

K. MAEDA, K. TAKENAKA, Y. SATO, H. NAKANO and M. TSUKAMOTO
Experimental Study on Blue Diode Laser Induced Powder Bed Fusion of Ti-6Al-4V for Improvement of Energy Efficiency
Proc. SPIE, 13350 (2025), 133500F-1-133500F-6.

K. TAKENAKA, K. KODA, K. Kotake, Y. SATO and M. TSUKAMOTO
Measurement of Heat Input in Pure Copper Welding with Blue Diode Laser
Peoceedings of the 102nd laser materials processing conference, 102 (2025), 85-88 (in Japanese).

K. TODA, R. SUZUKI, Y. HOSHINO, K. ITO, S.-M. HONG, H.-H. ZARGARI and S. OZAWA
Fatigue Life Increase Caused by Weld-metal Shape Control Using High Hardness Due to Wire Cr Content for Lap-fillet Arc Welded Joints of 1.2 GPa Grade Cold-rolled Ultra-high Tensile Strength Steel Sheets
IIW-XII-2780-2025, (2025)

K. KUSHIMOTO, A. KONDO, T. KOZAWA, M. NAITO and J. KANO
Analysis of the Mechanism of Agglomeration during Wet Ball Milling by Using DEM-CFD Simulation
Trans. Indian Ceram. Soc., (2025), 1-7.

K. IWASHITA, T. OKAMOTO, T. FUKUGAWA, T. AZAMA, F. MIYASAKA and H. SERIZAWA
Study on Arc Pressure Radius and Droplet Injection Depth in Penetration Shape Analysis for MAG Welding - Part 2 : Application to Actual Vehicles –
Proc. Syposium on Joining Technologies in Advanced Automobile Assembly 2025, (2025), 267-271 (in Japanese).

[Materials, Metallurgy & Weldability]

Y. WANG, D. WU, J. CHEN, H. KOMEN, M. CHEN, H. SU, C. WU and M. TANAKA
Pore Suppression and Performance Improvement Mechanisms in Wire-Arc Directed Energy Deposition of 7075 Alloy
Virtual Phys. Prototyp., 20 (2025), e2464953.

Y. SHEN, F. CHEN, R. GAO, C. HO, H. NISHIKAWA and C. CHEN
Effect of Bi Addition on Melting Behavior, Solder Joint Strength, and Thermal Aging Resistance of Sn-3.5Ag/Cu Joints
JOM, 77 (2025), 4206-4241.

S. HE, X. LIU, Z. PAN, S. GAO, Y. ZUO and H. NISHIKAWA
Tailored Microstructure and Enhanced Bonding Strength of In-Situ Surface Modified Cu Flakes via Oxidation–reduction Bonding
Mater. Des., 254 (2025), 114048.

S. PAK, H. TATSUMI, J. WANG, A.-T. WU and H. NISHIKAWA
Interfacial Reaction and IMC Growth Kinetics at the Bi2Te3/Ag Interface during Isothermal Aging
Intermetallics, 179 (2025), 108686.

W. WANG, S. CHERNG, Y. HUANG, R. GAO, H. TATSUMI, H. NISHIKAWA and C. CHEN
Low-temperature Soldering Using Sn/Bi Electrodeposited Bilayer
Mater. Sci. Semicond. Process, 186 (2025), 109056.

H. TATSUMI, C.-R. KAO and H. NISHIKAWA
Atomistic Behavior of Cu–Cu Solid-State Bonding in Polycrystalline Cu with High-Density Boundaries
Mater. Des., 250 (2025), 113576.

J. KIM, H. TATSUMI and H. NISHIKAWA
Direct Formation of Cu Nano-Dendritic Structure on Substrate by Dynamic Hydrogen Bubble Template for Organic-Free Sintered Cu-to-Cu Bonding
Surf. Interfaces, 62 (2025), 106268.

S. PAK, H. TATSUMI, J. WANG, A.-T. WU and H. NISHIKAWA
Interfacial Reaction and IMC Growth Kinetics at the Bi2Te3/Ag Interface during Isothermal Aging
Intermetallics, 179 (2025), 108686.

J. KIM, H. TATSUMI and H. NISHIKAWA
Sintered Cu-to-Cu Joints Using Cu Dendritic Structure Formed by a Dynamic Hydrogen Bubble Template with Cetyltrimethylammonium Bromide
Proc. 2025 Int. Conf. Electron. Packag. (ICEP2025), (2025), 197-198.

R. GAO, H. TATSUMI, T. KOBATAKE, M. UESHIMA and H. NISHIKAWA
Predictive Validity for Sintered Die-Attach Performance Based on Cross-Sectional Morphology
Proc. 2025 Int. Conf. Electron. Packag. (ICEP2025), (2025), 169-170.

C.-H. LIN, H. TATSUMI, J.-M. SONG and H. NISHIKAWA
Glass to Glass Joint by Low Temperature Soldering Using Localized Induction Heating Process
Proc. 2025 Int. Conf. Electron. Packag. (ICEP2025), (2025), 27-28.

X. WANG, H. TATSUMI and H. NISHIKAWA
Regulating Sn Grain Orientations in Soldered Joints through CoSn3
Proc. 2025 Int. Conf. Electron. Packag. (ICEP2025), (2025), 25-26.

Y. HAYASHI, J. KIM, M. YABASHI and H. TATSUMI
Non-Destructive X-Ray Orientation Mapping of Die-Attach Solder for Thermal Cycling Test
2025 Int. Conf. on Electronics Packaging and iMAPS All Asia Conf. (ICEP-IAAC), (2025), 137-138.

X. LIU, H. TATSUMI, Z. JIN and H. NISHIKAWA
Evaluations of Transient Liquid Phase Joints Using In-Coated Ag Sheet
Proc. 25th Eur. Microelectron. Packag. Conf. Exhibition, (2025), 3A-3-1-3A-3-5.

H. TATSUMI, Y. HAYASHI, J. KIM, M. YABASHI and H. NISHIKAWA
Grain Orientation Analysis for Thermal Cycling Evaluation of Die-Attach Solder Joints
Proc. 25th Eur. Microelectron. Packag. Conf. Exhibition, (2025), S-4D-9-1-S-4D-9-5.

I. SAKAMOTO, H. TATSUMI and H. NISHIKAWA
Reliability of Transient Liquid-Phase Bonded Layer Using Cu-SnAgCu Molded Sheets by High-Pressure Powder Compression
J. Smart Process., 14, 6 (2025), 301-308 (in Japanese).

H. TATSUMI, S. NITTA, A.-M. ITO, A. TAKAYAMA, M. TAKAHASHI, S. MOON, E. TSUSHIMA and H. NISHIKAWA
Experimental and First-Principles Insights into Ti-Mediated Cu–Si_3N_4 Interfaces for High-Reliability Electronic Substrates
Acta Mater., (2025), 121813 (in Japanese).

X. WANG, H. TATSUMI, C. LI, J. LEE and H. NISHIKAWA
Ion Milling-Enhanced Preferential Growth of CoSn3 for Crystallographic Orientation Control of Sn on Polycrystalline Co Substrates
Mater. Des., (2025), 115329.

M. WAHBA, S.-M.-I. SHAMSAH, M.-A.-H. GEPREEL and M. TAKAHASHI
High-power Ultrasonic Spot Welding of Copper to Type 304L Austenitic Stainless Steel
Weld. World, 69 (2025), 555-569.

M. TAKAHASHI
Lap Anodic Bonding of Dissimlar Glasses by Lowering the Bonding Temperature
31st Symp. on "Microjoining and Assembly Technology in Electromics", (2025), 161-166 (in Japanese).

K. SHIMIZU, S. NAKAYAMA, H. SHOJI, T. KAWAKUBO, T. NAGIRA, M. OHATA and H. FUJII
Significance of Fracture Toughness for Linear Friction Welded Joint of Weathering Steel
Weld. World, 69, 3 (2025), 739-750.

S. ZHU, X. ZHU, W. LV, J. CHEN, Y. SUN, L. WU, H. FUJII and S. GUAN
Effect of Power on the Microstructure and Mechanical Properties of 1500 MPa Martensitic Steel Joints in Laser-Assisted Friction Stir Welding
Arch. Civ. Mech. Eng., 25, 96 (2025).

S. ZHU, X. ZHU, W. LV, L. CEN, M. GAO, Y. SUN, L. WU, H. FUJII and S. GUAN
The Influence of Laser-Induced Tempering on the Microstructure and Mechanical Properties of 1500 MPa Martensitic Steel Friction Stir Welded Joints
Opt. Laser Technol., 182, 112094 (2025).

A. CHAUDHARY, R. MISHRA, C. RAMESH, V. CHINTHAPENTA, M. IMAM, Y. SUN, H. FUJII and S. TSUTSUMI
Experimental and Numerical Investigation of Laser-FSW Hybrid Welding Technique for High Strength Materials and Thick Aluminium Welds
Weld. Int., (2025).

J. CHOI, R. HINO, K. USHIODA, H. FUJII and S. LEE
Critical Review of Solid-State Welding for Al Alloys with High Joint Efficiency: Friction Stir Welding (FSW) Vs. Linear Friction Welding (LFW)
Met. Mater. -Int., (2025).

J. CHEN, T. MIURA, K. USHIODA, A. SHARMA and H. FUJII
Elucidating the Role of Ordered Phases and Carbides in the Mechanical Performance of Friction Stir Welded High Aluminum Low-Density Ferrite Steels
J. Mater. Process. Technol., 343 (2025), 118959.

H. CHOI, H. FUJII and S. LEE
Dynamic Recrystallization, Textural Evolution, and Strengthening Mechanism of Medium-Mn Steel Subjected to Friction-Stir Welding (FSW)
Mater. Charact., 227 (2025), 115307.

A. SHARMA, S. SINGH, Y. MORISADA, K. USHIODA, J. ANDERSSON and H. FUJII
Microstructural Evolution and Mechanical Behavior of Friction Stir Welded Additively Manufactured Haynes 282 Ni Superalloy
Mater. Des., 260 (2025), 115029.

M. MORI, Y. NODA, A. SHARMA, Y. MORISADA and H. FUJII
Tilted-tool Friction Stir Welding of Steel Material by Using Hemispherical Silicon Nitride Tool
Tetsu-to-Hagane, 111, 17 (2025), 1035-1045 (in Japanese).

N. KINOUCHI, Y. AOKI, K. USHIODA, M. NAKAI, H. MATSUMOTO and H. FUJII
Microstructure and Mechanical Properties of A+β (near B) Ti-17 Alloy Linear Friction-welded Joints
Tetsu-to-Hagane, 111, 17 (2025), 1105-1117 (in Japanese).

K. KWON, S. GONG, H. KIM, H. FUJII, S. SHIN and S. LEE
Dependence of Friction-Stir Welding on Mechanism of Hydrogen Embrittlement in Medium-Mn Steel with Triplex-Phase Microstructure
Acta Mater., 292 (2025), 121059.

J. CHEN, T. MIURA, K. USHIODA and H. FUJII
Elucidating Deformation Behavior of Cementite and K-Carbide during Friction Stir Welding of Fe-0.1C-xAl (x = 0.05 and 5 Mass%) Steels below A1
Mater. Charact., 225 (2025), 115205.

H. LIU, K. CHEN, Z. WU, Y. LI, Y. MORISADA and H. FUJII
A Novel Multi-Stage Pressuring Strategy to Fabricate Sound High-carbon Steel Joints in Rotary Friction Welding
J. Manufacturing Processes, 133 (2025), 957-968.

K. WANG, W. ZHANG, T. OGURA, Y. MORISADA, X. ZHAO and H. FUJII
Superplastic Behavior of Fine-Grained Ti-10V-2Fe-3Al Alloy Fabricated by Friction Stir Processing
J. Mater. Sci. Technol., 206 (2025), 26-36.

Y. HANGAI, T. ISHIGAI, S. KOYAMA, R. SUZUKI, Y. MORISADA and H. FUJII
Easy Dismantling of Steel/aluminum Alloy Die-Casting Joint by Foaming Using Gas Defects in Aluminum Alloy Die-Casting
Mater. Lett., 386, 138236 (2025).

Y. YAMAMOTO, Y. HANGAI, T. OGURA, Y. MORISADA and H. FUJII
In-situ X-ray Transmission Observation of Resin Impregnation Behavior during Friction Welding of Porous Aluminum and Thermoplastic Resin
J. Jpn Ins. Light Met., 75, 5 (2025), 238-244 (in Japanese).

N. KONDA, M. MORI, Y. SHINDOH, T. KITAMURA, Y. AOKI and Y. MORISADA
Fatigue Strength Evaluation of Linear Friction Welded Joints for S55C Steel Plates
Q. J. Jpn. Weld. Soc., 43, 2 (2025), 319-327 (in Japanese).

A. KAR, Y. MORISADA, A. SHARMA and H. FUJII
Precision Control of Microstructure Variation and Tensile Properties in Dissimilar Friction Stir Lap Welding Joints Using an Adjustable Tool
Sci. Rep., 27330 (2025).

K. SHENG, S. GUAN, Y. SUN, Y. MORISADA and H. FUJII
Research on Strength-Ductility and Fracture Behavior of Ultra-Fine Bio-Magnesium Alloys via Double-Sided Friction Stir Processing Using Liquid CO_2 Cooling
J. Magnes. Alloy., 13, 8 (2025), 3725-3739.

T. AIBARA, Y. MORISADA, K. USHIODA, T. MIYAUNCHI, S. HASEGAWA and H. FUJII
Cold Spot Joining of Galvannealed DP780 Mpa Steel Sheets
ISIJ Int., 65, 9 (2025), 1359-1368.

A. SHARMA, Y. MORISADA, K. USHIODA, S. SINGH and H. FUJII
Influence of Welding Speed on Mechanical Properties and Fracture Behaviour of Friction Stir Welded Haynes® 282 Ni Superalloy
Mater. Sci. Eng. A., 941 (2025), 148619.

F. KHAN, T. MIURA, Y. MORISADA, K. USHIODA and H. FUJII
Process Parameter Optimization and Bonding Mechanism in Dissimilar S45C/A6061 Joints via Novel Sacrificing-Sheet Linear Friction Welding
J. Adv. Join. Process., 12 (2025), 100331.

T. NAGIRA, T. NAKAMURA, T. SAWAGUCHI, M. MORI, Y. MORISADA and H. FUJII
Friction Stir Welding of Fe–15Mn–10Cr–8Ni–4Si Seismic Damping Alloy
Tetsu-to-Hagane, 111, 17 (2025), 1046-1056 (in Japanese).

T. MIYAUCHI, Y. MORISADA, K. USHIODA, H. FUJII, Y. MORITA, Y. TANAKA and S. HASEGAWA
Cold Spot Joining of 980 MPa-class Ultra-high Strength Steel
Tetsu-to-Hagane, 111, 17 (2025), 1085-1096 (in Japanese).

H. LIU, J. LI, H. HUANG, Z. WU, Y. MA, Y. LI, Y. MORISADA and H. FUJII
Elucidation of Interface Joining Mechanism during Pressure-Controlled Joule-heat Forge Welding of High-Carbon Steel via Experimental and Numerical Approaches
J. Mater. Process. Technol., 339 (2025), 118824.

F. KHAN, T. MIURA, Y. MORISADA, K. USHIODA and H. FUJII
Novel Sacrificing-Sheet Linear Friction Welding Method to Fabricate Sound Dissimilar Joint between Steel and Aluminum Alloy
Sci. Technol. Weld. Joining, 30, 30 (2025), 273-285.

Y. MORISADA and H. FUJII
Novel Separation Method for Steel Materials Utilising Hydrogen: Towards the Establishment of Integrated Joining and Separation Technology
Welding Tech., 73, 9 (2025) (in Japanese).

Y. MORISADA and H. FUJII
Controlling Welding Temperature in Solid-state Welding Methods
J. Jpn. Welding Soc., 94, 6 (2025), 329-334 (in Japanese).

Y. MORISADA and H. FUJII
Controlling Welding Temperature in Solid-state Welding Methods
J. Jpn. Welding Soc., 94, 6 (2025), 329-334 (in Japanese).

X. WANG, Y. MORISADA, W. WU, P. GENG and H. FUJII
Microstructure Characteristics and Joining Mechanisms of Double-Sided FSSWed Ultra-High Strength Lightweight Steel and Mild Steel
Mater. Today Commun., 47 (2025), 113080.

H. MIAO, T. YAMASHITA, K. USHIODA, S. TSUTSUMI, Y. MORISADA and H. FUJII
Improving Fatigue Property of Linear Friction Welded Cruciform Joints of Low Carbon Steel
J. Manufacturing Processes, 146 (2025), 55-64.

T. NAGIRA, H. KITANO, T. KIMURA, F. YOSHINAKA, S. TAKAMORI, T. SAWAGUCHI, T. YAMASHITA, Y. AOKI and H. FUJII
In Situ Synchrotron X-ray Imaging of Curved Columnar Growth and Ripple Formation in Fe-Mn-Cr-Ni-Si Alloy during GTA Welding
Sci. Technol. Weld. Joining, 30, 4 (2025), 296-304.

W. GONG, S. HARJO, T. KAWASAKI, T. YAMASHITA, A. SHIBATA, T. SHINOZAKI, Y. TOMOTA and N. TSUJI
Effect of Ausforming on Isothermal Transformation below the Martensite Start Temperature in NiCrMoV Steel: an In-Situ Neutron Diffraction Study
Microstructures, 5, 4 (2025).

T. NAGIRA, H. KITANO, T. KIMURA, F. YOSHINAKA, S. TAKAMORI, T. SAWAGUCHI, T. YAMASHITA, Y. AOKI and H. FUJII
In Situ Synchrotron X-ray Imaging of Curved Columnar Growth and Ripple Formation in Fe-Mn-Cr-Ni-Si Alloy during GTA Welding
Sci. Technol. Weld. Joining, (2025).

R. SHOTRI, T. MIURA, P. GENG, Y. MORISADA, K. USHIODA and H. FUJII
Understanding Thermal-Mechanical Variations and Resulting Joint Integrity of Pressure-Controlled Linear Friction Welding of Thin-Steel Sheets
Int. J. Machine Tools and Manufacture, 204, 104235 (2025).

F. KHAN, T. MIURA, Y. MORISADA, K. USHIODA and H. FUJII
Dissimilar Joining of A7075 Aluminum and SS400 Steel Utilizing Center-Driven Double-Sided Linear Friction Welding Using Mild Steel as a Center Material: Processing, Mechanical and Microstructure Characterization
J. Manufacturing Processes, 139 (2025), 67-80.

J. SONG, T. MIURA, H. FUJII and S. TSUTSUMI
Fatigue Performance Evaluation of FSW Joints in High-aluminum and High-phosphorus Weathering Steel
Tetsu-to-Hagane, 111, 17 (2025), 1026-1034 (in Japanese).

J. CHEN, T. MIURA, K. USHIODA and H. FUJII
Microstructures and Mechanical Properties of FSWed Fe-xAl and Fe-0.1C-xAl Alloys
J. Mater. Res. Technol-JMRT, 36 (2025), 888-902.

M.-H. HOU, L. JIA, Y. LI, Z. LU and K. KONDOH
Preparation of TiCp/Ti (Cr) Composites with High Strength and Plasticity by Alloying and Compositing Synchronously
Mater. Sci. Eng. A., 940 (2025), 148553.

B. CAI, M. CHEN, B. CHEN, J. WAN, J. SHEN, K. KONDOH and J. LI
Developing Pure Titanium with 1 GPa Tensile Strength and 24 % Elongation by Interstitial Oxygen Doping
Mater. Charact., 228 (2025), 115362.

Y. YANG, B. CHEN, K. KONDOH and J. SHEN
Water Quenching Enhances Ductility of Titanium Alloys with Ultra-High Interstitial Solutes
Scr. Mater., 274 (2025), 117144.

J. UMEDA, T. TANAKA, S. KARIYA, A.-S.-B.-M. NAJIB, A. BAHADOR and K. KONDOH
Mechanical Properties and Anisotropy Analysis of A+β Dual Phase Ti-Fe Sintered Alloys via Hot Rolling Process
J. Jpn. Soc. Powder Powder Metal., 72, 10 (2025), 210-216.

J. UMEDA, T. TANAKA, S. KARIYA, A.-S.-B.-M. NAJIB, A. BAHADOR and K. KONDOH
Mechanical Properties and Anisotropy Analysis of A+β Dual Phase Ti-Fe Sintered Alloys via Hot Rolling Process
J. Jpn. Soc. Powder Powder Metal., 72, 10 (2025), 210-216.

S. LI, S. LI, H. LIU, L. LIU, S. WANG, D. HUI, J. YAN, R. ZHOU, D. TAO, W. HUANG, J. GAO, X. HOU, X. ZHANG, B. LI, Z. WANG, G. LI, J. LUAN, J. UMEDA, K. KONDOH, P.-J. WITHERS and Y. ZHU
Ultrastrong and Ductile Hierarchical Heterostructured Titanium Composites from Room to High Temperatures
Adv. Powder Mater., 5, 2 (2025), 100369.

A. HIRAKO, S. KARIYA, J. UMEDA, K. YAMANAKA, X. LI and K. KONDOH
Identification of Strengthening Factors in Hot-rolled Dual Phase PM Ti-Fe Alloys by a Machine Learning Approach
J. Jpn. Soc. Powder Powder Metal., 72, 3 (2025), 73-78 (in Japanese).

S. KARIYA, H. HANADA, A. ISSARIYAPAT, T. TERAMAE, J. HUANG, J. UMEDA and K. KONDOH
Basal Oriented Columnar Microstructure Formation in Laser Powder Bed Fusion Prepared A Titanium Alloy
J. Jpn. Soc. Powder Powder Metal., 72, Supplement (2025), S497-S501.

S. KARIYA, H. HANADA, A. ISSARIYAPAT, T. TERAMAE, J. HUANG, J. UMEDA and K. KONDOH
Basal Oriented Columnar Microstructure Formation in Laser Powder Bed Fusion Prepared A Titanium Alloy
Journal of the Japan Society of Powder and Powder Metallurgy, 72 (2025), S497-S501.

J. HUANG, A. ISSARIYAPAT, S. KARIYA, J. UMEDA and K. KONDOH
Low Alloy Titanium: A Sustainable Alternative for Laser Powder Bed Fusion
Journal of the Japan Society of Powder and Powder Metallurgy, 72 (2025), S187-S193.

S. MIYAMOTO, S. KARIYA, J. UMEDA, B. CHEN, J. SHEN, S. LI, A.-N. ALHAZAA and K. KONDOH
Strengthening Mechanism of Powder Metallurgy Hot-Rolled Ti-Zr-TiC Composites
Mater. Trans., 66, 7 (2025), 888-894.

S. KARIYA, Y. HAYASHI, A. ISSARIYAPAT, J. UMEDA, S.-K. MOON, B. CHEN, S. LI and K. KONDOH
Microstructures Formation and Strengthening Mechanism of Ultra-Rapidly Solidified Powder Metallurgy Ti-Si Alloys via Hot Rolling Process
Mater. Trans., 66, 8 (2025), 953-964.

S. KARIYA, E. ICHIKAWA, T. TERAMAE, S. LI, X. LI, K. KONDOH and J. UMEDA
Microstructure and Strengthening Mechanism of Powder Metallurgy Extruded Titanium Alloys with Carbon Solid Solution
Mater. Trans., 66, 8 (2025), 965-972.

S. KARIYA, A. ISSARIYAPAT, A. BAHADOR, M. QIAN, J. UMEDA and K. KONDOH
Microstructure and Strengthening Mechanism of Fe-Supersaturated A Titanium Alloy Produced by Laser Powder Bed Fusion
Mater. Trans., 66, 10 (2025), 1313-1318.

S. KARIYA, K. NAGATA, J. UMEDA, B. CHEN, J. SHEN, S. LI and K. KONDOH
Strengthening Mechanism of Ti-Zr Sintered Alloys with Sc Addition
Mater. Trans., 66, 10 (2025), 1287-1296.

A. HIRAKO, S. KARIYA, J. UMEDA, K. YAMANAKA, X. LI and K. KONDOH
Identification of Strengthening Factors in Hot-Rolled Dual Phase PM Ti-Fe Alloys by a Machine Learning Approach
Mater. Trans., (2025).

S. KARIYA, E. ICHIKAWA, A. ISSARIYAPAT, J. UMEDA, B. CHEN, A. BAHADOR and K. KONDOH
Carbon Solid Solution Effect on Microstructures of Laser Powder Bed Fusion Prepared Ti Alloys
Mater. Trans., 66, 11 (2025), 1425-1431.

Y. YANG, X. WANG, B. CHEN, S. LU, K. LIU, S. KARIYA, X. SHI, X. LIAO, K. KONDOH, M. QIAN and J. SHEN
Oxygen-mediated High Uniform Plasticity in A-B Titanium Alloys
Nat. Commun., 16 (2025), 10833.

R. ANAN, S. KARIYA, S. LI, Y. YANG, J. UMEDA and K. KONDOH
Microstructures in Heat Treated LPBF Ti-6Al-4V Alloys after A'phase Decomposition and Their Mechanical Properties
Mater. Trans., (2025).

M. MATSUSHITA, D. YMAGISHI, K. TANIGUCHI, R. IKEDA and H. FUJII
Development of High Speed Welding Technology for Advanced High Strength Steel Sheets Applying Pre-Heating Process to Double-Sided Friction Stir Welding
Q. J. Jpn. Weld. Soc., 42, 4 (2025), 167-178 (in Japanese).

M. MATSUSHITA, D. YAMAGISHI, K. TANIGUCHI, R. IKEDA and H. FUJII
Development of High-Speed Double-sided Friction Stir Welding Technology with Pre-heating Process for Automotive Advanced High Strength Steel
Miner. Met. Mater. Ser., (2025), 3-5.

T. YAMAMOTO, Y. OGAWA, M. HAYASHI, K. KADOI, D. SHIOZAWA and T. SAKAGAMI
Estimation of Fatigue Limit for Aluminum Alloy Laser Welds Based on Dissipated Energy
Adv. Exp. Mech., 65, 3 (2025), 385-395.

Y. HOU and K. KADOI
Nucleation of Equiaxed Δ-Ferrite Grain by Oxide + TiN to Improve Tensile Properties of Ferritic Stainless Steel Welds
Mater. Charact., 227 (2025), 115270.

K. KADOI, Y. NAKAMORI, K. YAMADA and T. OSUKI
Relationship between Grain Boundary Characteristic and Liquation Cracking Susceptibility of Alloy 625
Mater. Des., (2025), 115400.

N. TSUCHIDA, S. TAKAMATSU, K. KADOI and S. SUZUKI
In-situ Observation of Melting Behavior of Al-6.4Si Alloy with Spherical Primary Crystal by SIMA Process
Mater. Trans., (2025).

F. SPIRRETT, S. KIRIHARA and N. TSURUTA
Additive Manufacturing of Geological Control Structures for Liquefaction Countermeasures
J. Japan Laser Proc. Scy., 32, 1 (2025), 1-5 (in Japanese).

F. SPIRRETT and S. KIRIHARA
Structural Control by Stereolithography Additive Manufacturing and Environmental Material Tectonics
Trans. Indian Ceram. Soc., 84, 1 (2025), 64-74.

K. YOSHIHARA, N. NAGAOKA, F. SPIRRETT, Y. MARUO, Y. YOSHIDA, B.-V. MEERBEEK and S. KIRIHARA
Top-Down Stereolithography-Based System for Additive Manufacturing of Zirconia for Dental Applications
Appl. Sci., 15, 11 (2025), 6155.

N. TSURUTA, F. SPIRRETT and S. KIRIHARA
Additive Manufacturing of Ultrasonic Transducers by Composite Layer Laminations and Mechanical Laser Processing -Piezoelectric Micropillars Fabrication for Hydrogen Generations by Effective Electrolysis of Desalinated Seawater by Ultrasonic Separations-
J. Smart Process., 14, 5 (2025), 238-242 (in Japanese).

F. SPIRRETT and S. KIRIHARA
Environmental Adaptability of Ceramic Dental Materials Fabricated by Stereolithography
J. Smart Process., 14, 5 (2025), 214-220 (in Japanese).

F. SPIRRETT and S. KIRIHARA
Mechanical Strengthening of Lightweight Metals by Fractal Pattern Surface Modification via Stereolithography
J. Smart Process., 14, 6 (2025), 294-300.

N.-T. HUYEN, T.-A.-S. SUONG, T.-T. CAO, V.-T. PHAM, N.-V. TU, H.-T. BUI, H.-T. VAN, T.-B. PHAM, C.-V. DUC, V.-H. PHAM, X.-H. VU, T.-V. TAN, N.-M. PHAN, H. ABE and C.-N. VAN
A New and Facile Preparation of 3D Urchin-Like TiO_2@graphene Core@shell SERS Substrates for Photocatalytic Degradation of RhB
Mater. Adv., (2025).

N.-T. HUYEN, T.-A.-S. SUONG, C.-T. THANH, N.-V. TU, P.-V. TRINH, T.-V. TAN, L.-T.-Q. XUAN, B.-H. THANG, T.-V. HAU, D. TUAN, P.-D. LONG, P.-N. MINH, H. ABE and N.-V. CHUC
Efficient Photocatalytic Degradation of Methylene Blue Using 3D Urchin-Like TiO_2@rGO-hBN Architecture
RSC Adv., 15, 14 (2025), 10754-10762.

Y. SUZUKI and H. ABE
Murataite Ceramics – Mineral, Structure, Synthesis and Applications
J. Ceram. Soc. Jpn., 133, 5 (2025), 189-196.

C.-T. THANH, N.-T. HUYEN, V.-T. THU, P.-V. TRINH, N.-V. TU, B.-H. THANG, T.-V. HAU, D. TUAN, M.-T. PHUONG, P.-T. BINH, P.-N. MINH, H. ABE and N.-V. CHUC
Improved Electrochemical Sensor Based on 3D Porous Gra-DCNTs-AuNPs-PANi Hybrid Film for Fenitrothion Detection
Mater. Lett., 386 (2025), 138209-138212.

N.-T. HUYEN, L.-T.-Q. XUAN, T.-A.-S. SUONG, C.-T. THANH, P.-V. TRINH, N.-V. TU, N.-T. LOAN, L.-T.-Q. NGAN, P.-T. BINH, C.-T.-L. HUONG, D.-N. THUAN, V.-X. HOA, N.-V. HAO, N.-V. QUYNH, H. ABE and N. CHUC
A Novel Approach for the Fabrication of SERS Substrates Based on 3D Urchin-Like TiO_2@Gr–AuNPs Architecture
RSC Adv., 15, 20 (2025), 15806-15818.

T. KOZAWA, R. FUJIWARA, K. FUKUYAMA, K. YOSHIDA, S. USUKI, M. KAWASHITA, K. HOSHINO, S. OTA and H. ABE
Magnetic Macroporous Microspheres from $FeCO_3$ via Water Vapor-Mediated Thermal Decomposition: Implications for Nanoparticle Capture and Biomedical Applications
ACS Appl. Nano Mater., (2025).

J. HUANG, A. ISSARIYAPAT, S. KARIYA, J. UMEDA and K. KONDOH
On the Viability of In-Situ Alloyed Ti-1Fe as a Strong and Ductile Alternative to Ti-6Al-4V for Laser-Based Powder Bed Fusion
Addit. Manuf., 105 (2025), 104788.

Y. PENG, C. CHEN, R. ZHAO, Y. HOU, X. LI, L. LU, A. ISSARIYAPAT, X. DU, L. LEI, J. WANG and Z. REN
Strong and Ductile Metastable β Titanium Alloy via Laser Powder Bed Fusion through Nitrogen Interstitials and Tailored Microstructure
Mater. Charact., 225 (2025), 115121.

T. TERAMAE, A. ISSARIYAPAT, A. BAHADOR, J. UMEDA and K. KONDOH
Strength Enhancement of A + β Dual Phase Ti-4Fe Alloys with Rhenium Addition at Room and High Temperatures
Mater. Des., 256 (2025), 114278.

T. TERAMAE, A. ISSARIYAPAT, S. KARIYA, J. UMEDA and K. KONDOH
Exploring B Stabilizing Elements of A+β Ti-Al Alloys for Facilitating In-Situ Martensite Decomposition in PBF-LB
J. Jpn. Soc. Powder Powder Metal., 72, 10 (2025), 201-209.

R.-V. CANTON, Y. MATSUNAGA, S. ZHANG, M. XUE, M. OSADA and R. KITAURA
Covalent Functionalization of Transition Metal Dichalcogenides with Perylene for Light Harvesting Devices
Nanoscale, 17 (2025), 8084-8100.

Y. XIA, F. MIYASAKA, H. SERIZAWA and H. MORI
Effects of Cooling Rate and Nitrogen Content on Morphologies and Precipitation of Widmanstätten Austenite in Welds of Duplex Stainless Steel
TMS2025 154th Annual Meeting & Exhibition Supplemental Proc., (2025), 1373-1382.

R. SHOTRI, G. MASUNO, M. MORI, Y. MORISADA, K. USHIODA, H. SERIZAWA and H. FUJII
Investigating Novel Forging Mechanisms for Thin Dissimilar Copper-Aluminum Rod Weldments via Pressure-Controlled Joule-Heating and Interfacial Deformation
J. Mater. Process. Technol., 343 (2025), 118992.

R. SHOTRI, Y. MORISADA, K. USHIODA, H. SERIZAWA and H. FUJII
Immiscible Cu-SS304 Thin Tube Forge Welding via Novel PJFW Process
Int. J. Mech. Sci., 305 (2025), 110780.

C. PHONGPHISUTTHINAN, W. RATTANATHAWORN, K. WAREE, T. SUGA, H. LIU, Y. MORISADA and H. FUJII
Friction Stir Welding of High Iron-Containing Cast Aluminum-Silicon-Magnesium Alloys.
Mater. Sci. Eng. Tech., 56, 2 (2025), 173-180.

U.-A. KHALIQ, M.-R. MUHAMAD, M.-F. ZULKIFLI, F. YUSOF, S. IBRAHIM, Z. BRYTAN, T. MIURA, T. SUGA, Y. MORISADA and H. FUJII
Enhanced Mechanical and Electrochemical Performance of Al/Mg Dissimilar Friction Stir Butt Welds Using AZ61 Magnesium Alloy
J. Mater. Eng. Perform., 32 (2025), 4185-4204.

[Mechanics, Strength & Structural Design]

W. MAO, W. GONG, T. KAWASAKI, S. GAO, T. ITO, T. YAMASHITA, S. HARJO, L. ZHAO and Q. WANG
Unique Deformation Behavior of Ultrafine-Grained 304 Stainless Steel at 20 K
Scr. Mater., 264 (2025), 116726.

H. MIAO, T. YAMASHITA, K. USHIODA, S. TSUTSUMI, Y. MORISADA and H. FUJII
Improving Fatigue Property of Linear Friction Welded Cruciform Joints of Low Carbon Steel
J. Manufacturing Processes, 146 (2025), 55-64.

T. YAMASHITA, N. KOGA, M. WENQI, W. GONG, T. KAWASAKI, S. HARJO, H. FUJII and O. UMEZAWA
Enhanced Work Hardening in Ferrite and Austenite of Duplex Stainless Steel at 200 K: In Situ Neutron Diffraction Study
Mater. Sci. Eng. A., 941 (2025), 148602.

T. KAWASAKI, S. HARJO, W. GONG, W. MAO, T. YAMASHITA, T. ITO and K. AIZAWA
Cryogenic Tensile Testing System for Simultaneous in Situ Neutron Diffraction and Digital Image Correlation Strain Analysis
Rev. Sci. Instrum., 96, 9 (2025).

R. TORAMOTO, T. YAMASHITA, K. USHIODA, T. OMURA and H. FUJII
Hydrogen Embrittlement Susceptibility of Linear Friction Welded Medium Carbon Steel Joints
Tetsu To Hagane-J. Iron Steel Inst. Jpn., 111, 17 (2025), 1072-1084 (in Japanese).

T. YAMASHITA, T. NAGIRA, W. GONG, T. KAWASAKI, S. HARJO, K. USHIODA and H. FUJII
Evaluation of Residual Stress Distribution in Linear Friction Welded Steel Joint via Neutron Diffraction Mapping Measurement
Tetsu To Hagane-J. Iron Steel Inst. Jpn., 111, 17 (2025), 1057-1071 (in Japanese).

X. GANA, D. YED, S. LI, S. XIAO, C. HU, K. KONDOH, S. KARIYA, L. ZHANG and Y. YANG
Inducing A″ Phase by Interstitial Carbon Atoms to Achieve Strength-Ductility Enhancement in As-Printed Ti Alloy
Mater. Res. Lett., (2025).

L. CAO, B. CHEN, J. WAN, J. SHEN, K. KONDOH, S. LI and J. LI
Simultaneously Improving Strength and Ductility of Carbon Nanotube (CNT)-reinforced Aluminum Matrix Composites by Embedding CNTs inside Matrix Grains
Compos. Pt. B-Eng., (2025), 112240.

K. KONDOH, N. NISHIMURA, K. SHITARA, S. KARIYA, K. CHEN and J. UMEDA
Direct Bonding Mechanism of Titanium and PET Resin via Heating and Pressurization: Influence of Bubble Dynamics on Bonding Strength
J. Adv. Join. Process., 11 (2025), 100301.

K. KONDO
Alloying Design of High-Strength Titanium Using Ubiquitous Elements
J. Soc. Automot. Eng. Jpn., 79, 5 (2025), 92-98 (in Japanese).

S. WANG, S. LAI, S. LI, D. HUI, H. LIU, C. TANA, S. ZHOU, X. ZHANG, B. LI, K. KONDOH, J. UMEDA, A. ISSARIYAPAT, S. KARIYA, J. HAN and D. ZHANG
Diffusion-dependent Microstructure and Mechanical Properties of Ti-50Ta Alloy via Powder Metallurgy
Mater. Charact., 225 (2025), 115164.

X. ZHUO, H. YA, K. CHEN, K. KONDOH, L. PENG, M. WANG, X. HUA and A. SHAN
Exceptional Metallurgical Bonding Mechanism via Nano-thick Layer of Interfacial Solid Solution in Dissimilar Welding
J. Magnes. Alloy., (2025).

K. KONDOH, N. NISHIMURA, K. SHITARA, S. KARIYA, K. CHEN, A.-S.-B.-M. NAJIB and J. UMEDA
Mechanistic Insight into Cooling-Rate-Driven Bubble Evolution and Interfacial Bonding Strength in Directly Bonded Ti-PET Materials
J. Adv. Join. Process., 12 (2025), 100345.

H. LUO, Y. GAO, W. SHI, F. QIAN, X. SHI, X. WANG, J. UMEDA, K. KONDOH, Y. WU, J. SHEN and L. NIU
Fabrication and Research of High Oxygen Concentration Titanium Implants with Excellent Mechanical Properties and Osteoconductivity
Mater. Des., 255 (2025), 114198.

L. LIU, S. LI, S. LI, H. LIU, S. WANG, D. HUI, X. ZHANG, S. KARIYA, J. UMEDA, K. KONDOH, A. BAHADOR, B. XIAO and Z. MA
Overcoming Strength-Ductility Trade-Off in Pelleted Heterostructure Titanium Matrix Composites by Optimizing Pellet Size
Mater. Charact., 222 (2025), 114803.

R. ANAN, S. KARIYA, S. LI, Y. YANG, J. UMEDA and K. KONDOH
Microstructures in Heat Treated LPBF Ti-6Al-4V Alloys after A′ phase Decomposition and Their Mechanical Properties
J. Jpn. Soc. Powder Powder Metal., 72, 4 (2025), 79-84 (in Japanese).

L. LIU, S. LI, S. LI, H. LIU, S. WANG, D. HUI, X. ZHANG, S. KARIYA, A. ISSARIYAPAT, J. UMEDA, K. KONDOH, B. XIAO and Z. MA
Microstructure and Mechanical Properties of Nano TiB Whisker-Reinforced Titanium Matrix Composites Using Atomized Ti-TiB Composite Powder as Raw Materials
Compos. Pt. B-Eng., 298 (2025), 112392.

D. BAJAJ, R. MEHAVARNAM, X.-F. FANG, N. MA, D.-Y. LI and D.-L. CHEN
Achieving Superior Aluminum-Steel Dissimilar Joining via Ultrasonic Spot Welding: Microstructure and Fracture Behavior
Mater. Sci. Eng. A., (2025).

Z. CHEN, L. YUAN, Z. PAN, H. ZHU, N. MA, D. DING and H. LI
A Comprehensive Review and Future Perspectives of Simulation Approaches in Wire Arc Additive Manufacturing (WAAM)
Int. J. Extreme Manuf., 7, 2 (2025), 22016.

Y. GE, A. YANG, Z. CHANG, N. MA and Q. WANG
Effect of Substrate Shape on Residual Stress in Laser Powder Bed Fusion Forming Parts
Mater. Charact., 221 (2025), 114765.

Y. GE, A. YANG, Z. CHANG, N. MA and Q. WANG
Enhancing Reliability in Laser Powder Bed Fusion through Substrate Modification: Microstructure, Mechanical Properties and Residual Stress
Opt. Laser Technol., 181, 111612 (2025), 1-16.

H. MA, P. GENG, Y. LI, A.-K. BANDARU, N. MA, T. LIU, R. LUO and G. QIN
Improving the Bonding Characteristics of the Friction-Welded 2A14 Al Alloy/ Steel Interface by Enabling Mutual Deformation
Mater. Sci. Eng. A., 926, 147790 (2025), 1-8.

S. WANG, Y. XU, W. WANG, X. ZHANG, Y. CHEN, P. GENG and N. MA
Evolution of Macro/mesoscopic Thermal-Mechanical Fields in Friction Lap Joining of Surface-Textured Al Alloy to CFRTP
J. Manufacturing Processes, 136 (2025), 356-369.

Y. GE, A. YANG, Z. CHANG, N. MA and Q. WANG
Effect of Substrate Shape on Residual Stress in Laser Powder Bed Fusion Forming Parts
Mater. Charact., 221, 114765 (2025), 1-15.

A. ELSHEIKH, M.-A.-E. OMER, A. BASEM, H. FAQEHA, A.-A. ALSAATI, M. THANGARAJ, F.-A. ESSA, S. SHANMUGAN, B. RAMESH, R. SATHYAMURTHY and N. MA
Recent Advances and Future Prospects of Laser Welding Technology for Polymeric Materials: A Review
J. Mater. Res. Technol-JMRT, (2025).

F. XIE, N. CHEN, X. ZOU, Z. CHENG, Y. PEI, N. MA, K. KONDOH, K. CHEN, M. WANG and X. HUA
Novel Vase-1 Shaped Structure Fabricated by Progressive Laser Surface Texturing for Strengthening Friction Spot Joints between 2219 Aluminum Alloy and PEEK
J. Manufacturing Processes, 142 (2025), 18-29.

R. ZHANG, D. NISHIMOTO, N. MA, K. NARASAKI, Q. WANG, T. SUGA, S. TSUDA, T. TABUCHI and S. SHIMADA
Asymmetric Molten Zone and Hybrid Heat Source Modeling in Laser Welding Carbon Steel and Cast Iron with Nickel Alloy Wires
J. Manufacturing Processes, 142 (2025), 177-190.

R. GENG, N. MA, D. NISHIMOTO, R. ZHANG, F. LU and Z. LI
Microstructure, Element Distribution and Interfacial Properties of Laser Welded Iron–nickel–steel Dissimilar Joints
J. Mater. Res. Technol-JMRT, (2025).

J. YUAN, Y. MA, Y. LIU, W. XU, N. MA and Y. LI
Fatigue Behavior and Failure Mechanism of Friction Self-Piercing Riveted Aluminum Alloy 2060-T8 Joints
Int. J. Fatigue, (2025).

C. LI, J. SONG, X. LUO, X. DONG, L. ZHANG, Q. WANG and N. MA
High Tensile Adhesive Strength NiCrMo Coating Enabled by Plasma-Spraying a Mo-clad NiCr Powder for Reliable Bond Coat Application
Surf. Coat. Technol., 505 (2025), 132072.

T. KAWABATA, H. KITANO, T. OZAWA and Y. MIKAMI
Reverse Bend Experiments on the Base Plate and Discussion of the Appropriate Amount of Reverse Bending for Precrack Straightness (Effect of the Reverse Bend Process on the CTOD Toughness Evaluation and Understanding of Its Mechanisms)
Theor. Appl. Fract. Mec., 37 (2025), 104869.

W. CHI, W. WANG, H. ZHOU, R. YAN and Y. MIKAMI
Multiscale Modelling of Additively Manufactured Ti-6Al-4V Alloy: Fatigue Performance Evaluation from Material to Structural Level
Int. J. Fatigue, 201 (2025), 109181.

[Others]

T. IWABUCHI, T. TENKUMO, T. MOKUDAI, T. OGAWA, K. SASAKI and N. YODA
Silver Ions and Bacteria as Promoters of UV-A Photocatalysis
Photochem. Photobiol. A-Chem., 463 (2025), 116269.

T. IWABUCHI, T. TENKUMO, T. MOKUDAI, M. TAKAHASHI, T. OGAWA, K. SASAKI and N. YODA
Enhanced Peri-Implantitis Management through Purple-LED Irradiation Coupled with Silver Ion Application and Calcium Phosphate Gene Transfection Carrier Coating
Sci. Rep., 15 (2025), 13759.

M. JIANG, K. NOZAKI, T. MOKUDAI, Y. NAKANO, M. UO, K. YAMASHITA, S. OHARA and N. WAKABAYASHI
Enhancing the Photocatalytic Activity and Antibacterial Efficiency of TiO_2 Nanosheets via Doping with Ag, Cu, or Ce
ACS Appl. Nano Mater., 8, 22 (2025), 11568-11581.

M. SHIMADA, Y. LI, M. KOBAYASHI, E. YAMAMOTO, R.-V. CANTON and M. OSADA
Mechanical Exfoliation of Non-Van Der Waals Solids: a Study of Layered Perovskite Ferroelectric CsPb2Nb3O10
Chem. Lett., 54, 2 (2025), upaf006.

C. FREYTAG, C. SCHUSTER, W. CUI, N. TAGMATARCHIS, R. CANTN-VITORIA, L. SHI, E. PARTH, K. YANAGI, P. AYALA and T. PICHLER
Nitrogen Doping of Confined Carbyne
J. Phys. Chem. Lett., (2025).

H. LI, R. CANTON - VITORIA, Y. URANO, S.-K. NAYAK, E. YAMAMOTO, M. KOBAYASHI, R. KITAURA and M. OSADA
Covalent Functionalization of MXenes with Porphyrin for Visible - Light Activation in Energy Conversion Nanodevices
small, (2025).

Joining and Welding Research Institute,
Osaka University, Japan

11-1 Mihogaoka, Ibaraki, Osaka 567-0047, Japan
Telephone +81-6(6879)8678
Facsimile +81-6(6879)8689
Web Site https://www.jwri.osaka-u.ac.jp/