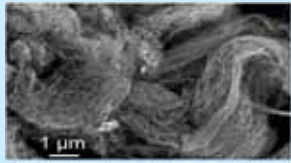


Tribological Properties of Carbon Nanotubes Coated onto Pure Titanium Plate

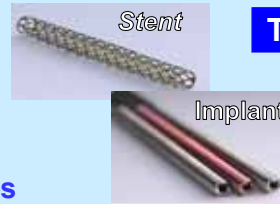
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Background and objectives

Carbon nanotube (CNT)



- Superior self-lubrication
 - High yield stress
 - High Young's modulus
- Naturally agglomeration as bundles



Titanium (Ti)

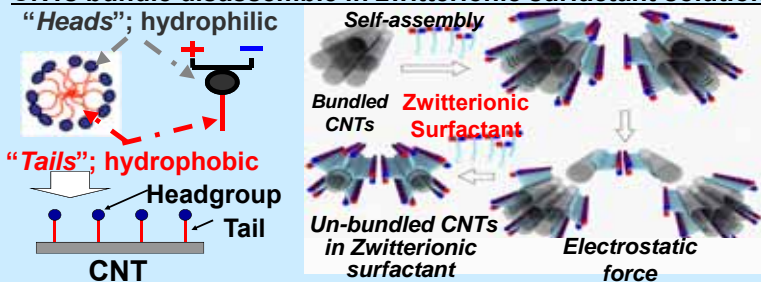
- High strength
 - Good corrosion resistance
 - Good biocompatibility
- Poor Tribology property contacted with other materials and Ti

Objectives: Investigate tribological property and wear behavior of pure Ti plate coated with CNTs under dry sliding condition

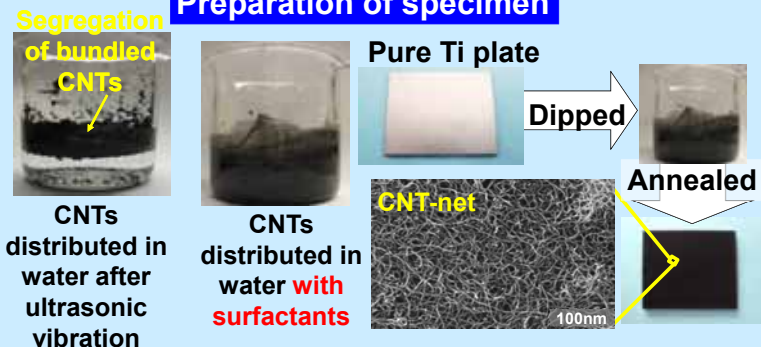
Materials and methods

CNT dispersions

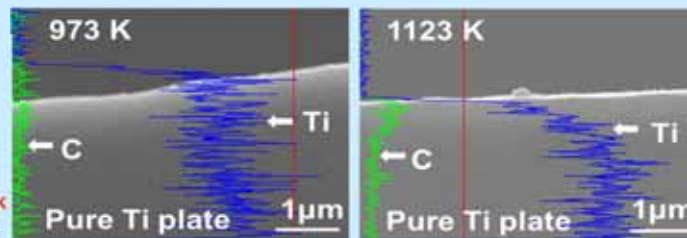
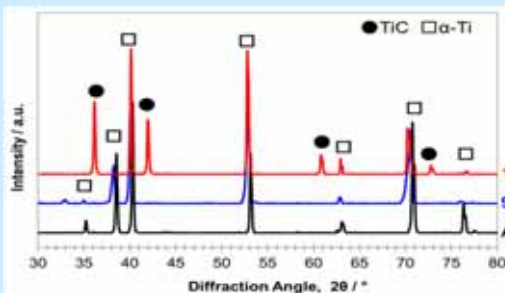
CNTs bundle disassemble in zwitterionic surfactant solution



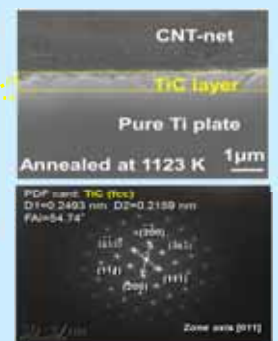
Preparation of specimen



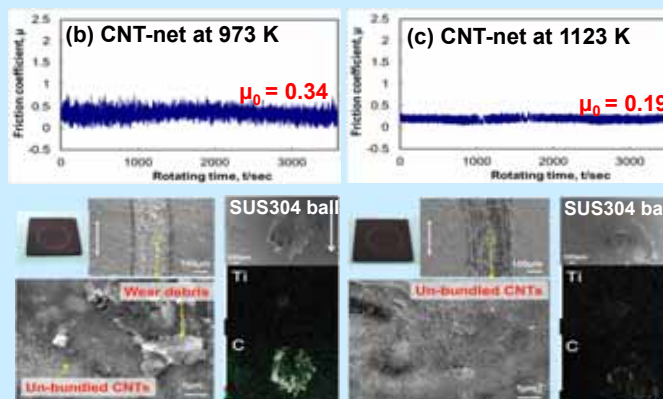
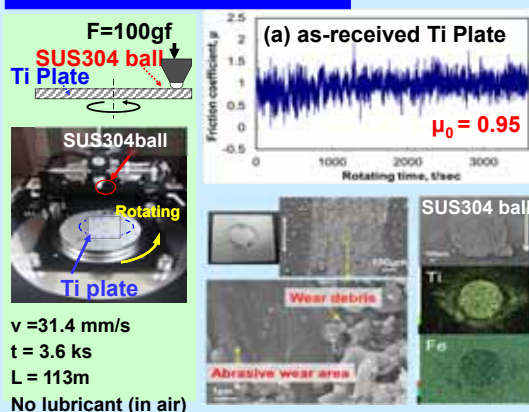
Results and Discussion



The carbon solution and TiC interlayer formation occurred at the interface between the CNTs coating film and Ti plate when the annealing at 1123 K was employed.



Ball-on-disk wear test



CNT-net completely remains on the wear track of (c), and no debris is observed due to TiC formation during annealing. As a result, a strong interface bonding between CNTs film and Ti plate surface was obtained by higher temperature annealing treatment, and obstructed the detachment of CNTs film during wear test.

Conclusion

The annealing treatment at higher temperature was more effective to reduce the friction coefficient than that at lower temperature. This is due to the acceleration of solid-state diffusion of carbon atoms originated from CNT into Ti became more active, and resulted in the formation of TiC interfacial layer having an important role to strongly bond the CNTs to the Ti plate.