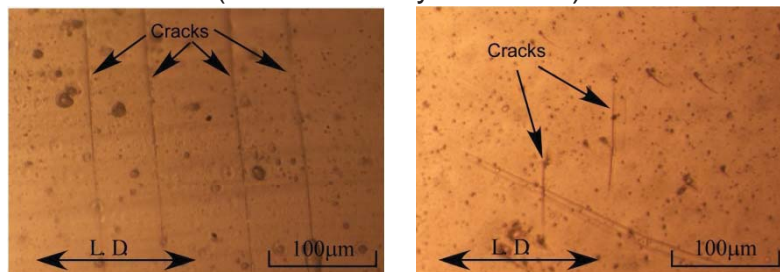


Fig. 1 S-N curves of uncoated samples & CrN coatings.
(Ti-6Al-4V alloy substrate)



(a) High bias voltage, $\sigma_a = 400$ MPa, $N = 1.5 \times 10^5$ cycles.
(b) Low bias voltage, $\sigma_a = 650$ MPa, $N = 4.0 \times 10^5$ cycles.

Fig. 2 Typical images of film surfaces after cyclic loading.

Content:

Physical vapor deposition (PVD) coatings are well-known surface treatment methods to improve the surface properties of various materials. PVD coatings generally show high wear resistance, low coefficient of friction and seizure resistance. Therefore, the coatings are widely used for tools etc. Chromium nitride (CrN) film is one of the film materials to improve wear and corrosion resistance.

The fatigue properties of the coatings are also changed by the deposition of the hard thin film. The fatigue strength is improved by depositing of hard thin films, however, the fatigue strength often degrades by depositing of the thin films under inappropriate conditions.

We have examined the influence of the film properties on the fatigue and fretting fatigue properties of the coatings. In this study, CrN films are deposited on steels and titanium alloy under the various condition by arc ion plating (AIP) method. As a result, we have clarified the fatigue strength level is determined by the crack initiation behavior which is related to the hardness, grain size, surface morphology, defects etc.

Keywords: Surface Treatment, Physical Vapor Deposition, Fatigue, Fracture, Wear.

E-mail: yonekura@tokushima-u.ac.jp

Tel. +81-88-656-9186

Fax +81-88-656-9082

