WEAR BEHAVIOUR OF Ti6Al4V ALLOY AGAINST Al_2O_3 UNDER LINEAR RECIPROCATING SLIDING

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ABSTRACT

Tribological behaviour of four different heat-treated Ti6Al4V alloys, during linear reciprocating sliding against alumina, on the microscale was investigated. Experiments were carried out for dry sliding and in the Ringer solution, over a range of loads (100–1000 mN) and speeds (4–12 mm/s). The wear mechanisms were investigated based on observations of worn surfaces. Specific wear rates for tested Ti6Al4V alloy were of order of 10^{-7}–10^{-4} mm^3/N m. The lowest wear factor (order of 10^{-7} mm^3/N m) was observed for the Ti6Al4V annealed for 1 h at 750°C in Ar atmosphere and then cooled down to room temperature in the furnace, tested in the Ringer solution. Load dependence of the wear factor exhibited transition characteristics. Wear mechanism has changed with change of load. The Ringer solution lowered wear factor for all tested conditions.

Keywords: Ti6Al4V, alumina, wear mechanism.

AIMS AND BACKGROUND

Tribological applications in many new fields of advanced materials applications, such as biomedical implants, impose growing challenges for engineering materials. Titanium and titanium alloys has been applied for medical purposes for years[1–4]. Extensive research activities in the manufacturing process and surface modification of Ti alloys are undertaken to improve its properties. Ti alloys are applied in cases when high strength and low density are of primary importance. They are particularly interesting because of their excellent biocompatibility, the

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