AN INVESTIGATION OF WEAR BEHAVIOUR OF HUMAN LIVING TEETH AND TITANIUM MATERIALS

H. Li and Z. R. Zhou
Tribology Research Institute, Southwest Jiaotong University, 610031 Chengdu, CHINA;
e-mail: zrzhou@home.swjtu.edu.cn

Keywords: Human living teeth, artificial saliva, wear behaviour, titanium material

ABSTRACT
Wear of teeth texture, one of most important tribological problem in human body, has received much attention in the medical field. Wear of teeth, either natural or artificial, is very tiresome but unavoidable. Excessive wear may lead to a lack of perfect contact between opposite teeth, disturbance in the efficiency of the masticatory system, and obliteration of chewing surfaces.

A great amount of investigations have been performed on the tribological behaviour of dental materials in the last 50 years. However, a traditional pin-disc test rig was used in most works with which masticatory motion cannot be realistically simulated. In recent years, a more complex biting apparatus has been devised to study wear behaviour. However, variation of friction force vs. motion amplitude could not be recorded as a function of test time. With the lack of kinetics characteristics, it is difficult to study the wear mechanism during testing.

Wear tests on human living teeth, opposing pure titanium and titanium alloy, have been carried out in dry and artificial saliva conditions. To better simulate friction of a pair of teeth, small amplitude (500 µm) reciprocating sliding wear tests, instead of traditional pin-disc friction tests, have been performed with a modified fretting machine. Friction coefficient, wear depth, wear mechanism have been analysed and compared. Experimental results show that the friction pair composed of pure titanium and natural tooth has a better tribological behaviour. This preliminary investigation should be very useful for clinical applications.