CONTRIBUTION OF HYDROGEN BONDING TO LUBRICATION PERFORMANCE OF POLYPHENYLENE ETHER

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ABSTRACT

Friction modifier (FM) molecules help mitigate friction and wear via their absorption on the surface of the friction pair[1-2]. This absorption is typically physical, however, fails partially at elevated temperatures or extreme conditions and thus provides only limited effect[3-4]. We reported an enhanced boundary lubrication performances of the conventional lubricant polyphenylene ether (PPE) after simple surface treatment, both as lubricant only or as lubricant additives. With the one-step surface hydroxylation of friction pair, the system shows lower friction coefficient then without. We believed the binding between FM and surface comprises physical absorption and hydrogen bonding, which forms stronger absorption and better support between surfaces and thus leads to lower friction coefficient[5]. The relation of film thickness to entrainment speed is studied and discussed as well. The properties of surface characterization and wear will be studied in the future. The findings provide interfacial insights underlying the lubrication performances and shed light on the new design of FM and other lubricant additives.

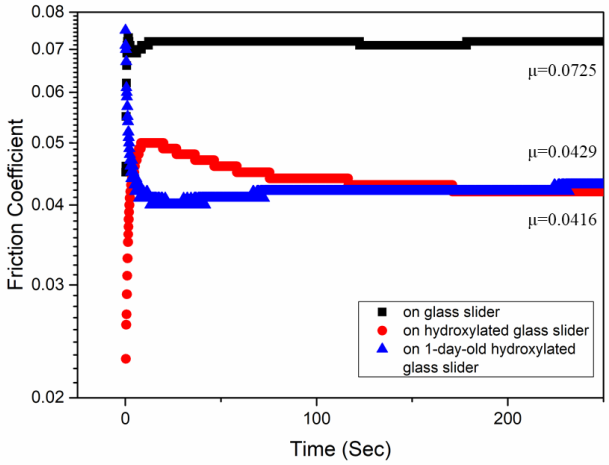

Fig.1 Friction coefficient as a function of time under lubrication between the PTFE ball and glass slider when PPE is used as a lubricant. Different colors stand for different conditions(black square for the plain glass slider, red dot for the fresh hydroxylated glass slider, blue triangle for the hydroxylated glass slider prepared one day before testing).

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