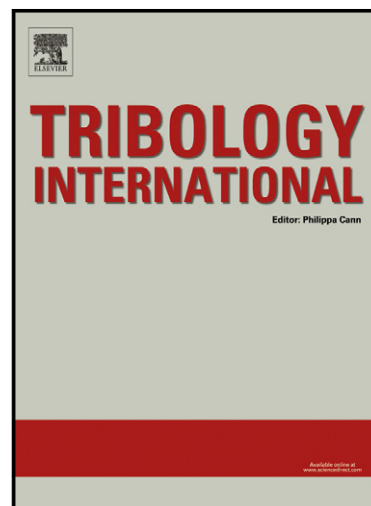


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Effect of surface morphology of diamond-like carbon coating on friction, wear behavior and tribo-chemical reactions under engine-oil lubricated condition

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Abstract

The tribological behaviors of diamond-like carbon (DLC) coatings sliding against steel lubricated with the low viscosity engine-oil containing MoDTC and ZnDTP additives are investigated. The “pre-structured DLC”, which is deposited on the micro-shot peened rough surface substrates, shows low friction coefficients and no significant wear, in comparison with the DLC coated on the usual polished substrates. The surface structuring can have positive effects on the lubricated contact regime to promote MoS₂ formation energetically in the additive-derived tribofilm, and inhibit an increasing DLC wear attributed to MoO₃ reduction involving hydrogen evolution and transformation of DLC. We discussed that different tribo-chemical reactions occurred, either positive or negative, depending on the surface morphology, hydrogen content and mechanical properties of DLC coatings.

Keywords: DLC coatings; surface morphology; tribochemistry; lubricant additives

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