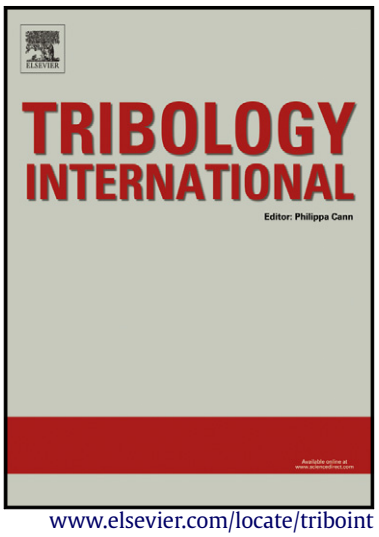

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Kentaro Komori, Noritsugu Umehara

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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

Kentaro Komori*

Honda R&D Co., Ltd. Automobile R&D Center,

4630 Shimotakanezawa, Haga-machi, Haga-gun, Tochigi, 321-3393 Japan

Noritsugu Umehara

Department of Mechanical Science and Engineering, Graduate School of Engineering, Nagoya University,

Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8603 Japan

* Corresponding author.

Telephone: +81 28 677 3311, Fax: +81 28 677 7386.

E-mail address: Kentaro_Komori@n.t.rd.honda.co.jp (Kentaro Komori).

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 MoS_2 formation energetically in the additive-derived tribofilm, and inhibit an increasing DLC wear attributed to MoO_3 reduction involving hydrogen evolution and transformation of DLC. We discuss~~ed~~ that different tribo-chemical reactions occur~~ed~~, 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