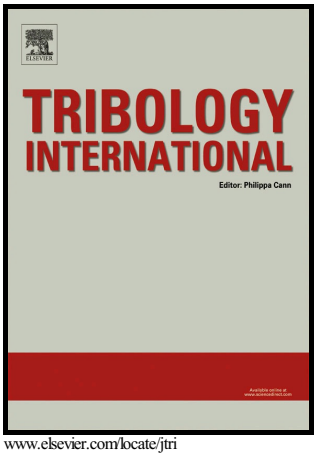

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Abstract

In order to control wear and friction in industry, Diamond like carbon (DLC) hard coatings are widely applied in recent years due to their well appreciated mechanical and tribological properties. However, those properties are not yet well understood, as well as behavior of DLC hard coatings when rubbed against other materials. Other researchers reported that DLC hard coatings film show high wear when rubbed against steel counterpart and their durability decrease with the increase of the temperature. In this research, we investigated on friction and wear properties of DLC coatings and the results reveal that carbon diffusion has a key role in the wear and friction behavior of DLC coatings when rubbed against steel.

1. Introduction

Increasing energy demand of the human population is a serious concern on sustainability of the Earth due to environment pollution and global warming. Under government's restrictions on the emission of harmful substances, saving energy consumption is a major challenge of modern automotive industry in order to build a sustainable society[31]. As a solution, Diamond like carbon (DLC) hard coatings are of all interest due to their mechanical and tribological properties [32]. In recent years, DLC hard coatings have been researched about extensively, in order to understand those properties, and related mechanisms. Literature broadly reported that introduction of a DLC film between steel/steel contact leads to an ultra-low friction coefficient in boundary lubrication [1-3]. The low friction mechanism of DLC coatings in oil environments is suggested to be based on graphitic related structural transformation of upper most surfaces, roughness reduction by tribochemical wear or to the passivation of dangling bonds through oil