

The Effect of Si and W Dopants on the Mechanical and Tribological Properties of Diamond-Like Carbon

L.Austin^{1*}, A.Neville¹, T.Liskiewicz¹, R.Tietema²

¹) Institute of Engineering Thermofluids Surfaces and Interfaces, Department of Mechanical Engineering, University of Leeds, Woodhouse Lane, Leeds, West Yorkshire, LS2 9JT

²) Hauzer Techno Coating BV, 5928 LL Venlo

*Corresponding author mmla@leeds.ac.uk

Introduction

Diamond-like carbon (DLC) coatings are recognised as a promising way to reduce friction and increase wear performance of automotive parts and are currently being introduced for some engine and transmission components. DLC coatings provide new possibilities in the improvement of the tribological performance of automotive components beyond what can be achieved with lubricant design alone.

In this work, three DLC coatings are tested and their properties compared. Properties taken into consideration are: Young's modulus, Hardness (nano and micro), thickness, chemical composition and tribology (friction and wear). The tests used to quantify these properties are nano indentation, micro indentation, ball abrasion testing, SEM/EDX, TEM (Figure 1)/EELS (Figure 2), pin on reciprocating plate tribometer and a white light interferometer, respectively.

The DLC coatings employed in this series of testing are a PACVD DLC and Si-DLC deposited at the University of Leeds and a W-doped DLC acquired from Oerlikon Balzers. The three samples will be subject to the same testing conditions in all cases and the results will be compared with a specific emphasis on application for the valve train in a passenger vehicle.

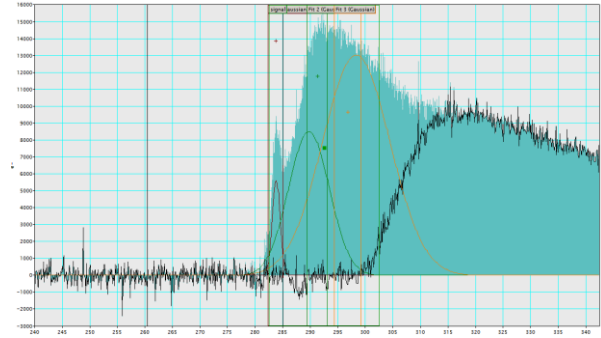


Figure 2: Curve fitted EELS spectra for W-doped DLC

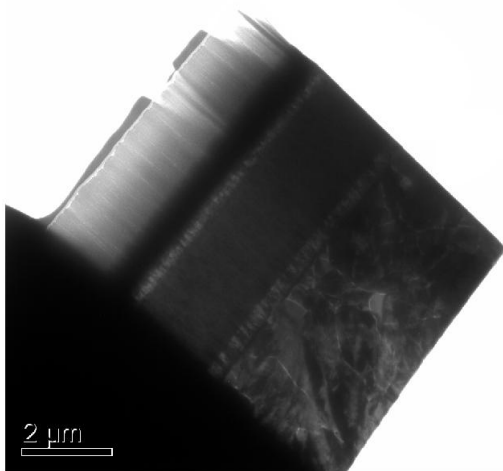


Figure 1: TEM micrograph of W-doped DLC