

# Characterization of Diamond-like Carbon Coating on 16Cr-1C Martensitic Stainless Steels

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## Abstract

The 16Cr-1C martensitic stainless steel can provide the higher hardness and better wear resistance for 440C steel. The microstructure of DLC coatings were observed by optical microscope and field-emission scanning electron microscope (FE-SEM). The compositional depth profile of DLC films were measured by field-emission Auger electron spectroscopy (Fe-AES). In addition, the micro-hardness and elastic modulus of DLC films were measured by nano-indentation tests. Experimental results show that the total thickness of coating was in the range of 600nm~1100nm. This coating was included of Ti/TiC transition layer and DLC layer. The Ti/TiC transition layer was grown on the 440C stainless steel substrate, and the upper layer was DLC layer. This layer structure was confirmed by the FE-AES analysis. The micro-hardness of DLC coating was measured in the range of 24.2GPa~26.0GPa, and the elastic modulus was measured in the range of 264GPa~313GPa in the nanoindentation test. The nanoscratch results show that DLC films have lower friction coefficients than 440C substrate.

Keyword : Diamond-like carbon, Martensitic stainless steel, Arc ion deposition, Nanoindenter