

PREPARATION OF COLOURED DLC NANOLAYERS AND THEIR NANOINDENTATION TESTING

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We prepared coloured DLC (Diamond-Like Carbon) nanolayers as decorative coatings of stainless steel sheets. These coatings must be adherent and hard for good wear resistance.

All films were prepared on grade Cr13 SS sheet substrate (10 x 10) cm. For the deposition of adherent DLC films on stainless steel substrate we applied deposition of very thin interlayer of Si-O-C. Deposition by PACVD (Plasma Assisted Chemical Vapour Depositin) of DLC films and of Si-O-C interlayer was performed using dc plasma without additional heating and with the HMDSO (hexamethyldisiloxane) and methane as precursors.

Microhardness was determined by nanoindentation using a Berkovich type diamond indenter in type NanoTest NT600 apparatus; the measurements were averages of at least 6 indentations at identical loads of 0.25 mN; loading and unloading (relief) time was 20 s, delay (creep at maximum load) was 10 s. The microhardness data were thickness-dependent, influenced by substrate. The highest measured value was 23 GPa.

Effect of film thickness on colour is following: The reference specimen (bare SS) has a bright metallic sheen. In the order of increasing thickness, the DLC films produced by PACVD have colours as follows: dark violet at ~50 nm; medium blue at ~100 nm; golden light at ~150 nm; deep rose pink at ~240 nm; golden brown at ~320 nm; and soot black at >500 nm.