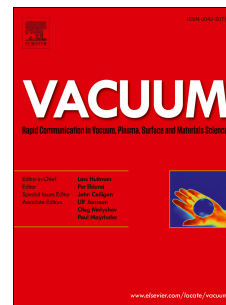


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Influence of hydrogen etching on the adhesion of coated ferrous alloy by hydrogenated amorphous carbon deposited at low temperature

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Abstract

Carbonaceous thin films show poor adhesion when deposited on steels. Chromium, titanium, and silicon-containing interlayers are generally used in order to prompt adhesion. This work shows a systematic study of the hydrogen effect on the physical-chemical properties of a-SiC_x:H interlayers deposited by using hexamethyldisiloxane on AISI 4140 at low temperatures (85°C to 180°C). In particular, the effect of the treatment on the adhesion of a-C:H thin films is reported. The results show that hydrogen radically modifies the tribological behavior inducing the adhesion of a-C:H thin films at temperatures as low as 85°C. The adhesion's improvement is associated with the hydrogen chemical etching that seems to remove more silicon than carbon atoms from the outermost face of the a-SiC_x:H interlayer promoting the formation of stronger carbon-carbon bonds. The results are also discussed showing the good results obtained by the use of the electrostatic confinement deposition technique.

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