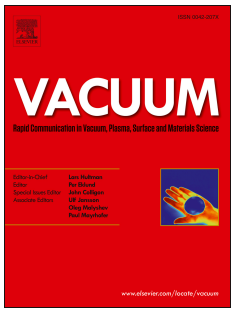
Accepted Manuscript



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

A.E. Crespi, L.M. Leidens, C. Aguzzoli, F. Alvarez, C.A. Figueroa

PII: S0042-207X(17)30790-X

DOI: 10.1016/j.vacuum.2017.07.038

Reference: VAC 7525

To appear in: *Vacuum*

Received Date: 14 June 2017

Revised Date: 0042-207X 0042-207X

Accepted Date: 31 July 2017

Please cite this article as: Crespi AE, Leidens LM, Aguzzoli C, Alvarez F, Figueroa CA, Influence of hydrogen etching on the adhesion of coated ferrous alloy by hydrogenated amorphous carbon deposited at low temperature, *Vacuum* (2017), doi: 10.1016/j.vacuum.2017.07.038.

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

A. E. Crespi[a,*], L. M. Leidens[a], C. Aguzzoli[a], F. Alvarez[b] and C.A. Figueroa[a,c,*]

[a] *PGMAT, Universidade de Caxias do Sul, Caxias do Sul, 95070-560, Brazil*

[b] *IFGW-DFA, Universidade Estadual de Campinas, Campinas, 13083-970, Brazil*

[c] *Plasmar Tecnologia Ltda., Caxias do Sul, 95030-775, Brazil*

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^{o}C to 180^{o}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^{o}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.