

## STUDY OF SILANE LAYERS GROWN ON STEEL AND CHARACTERIZED USING ELLIPSOMETRY AT DIFFERENT WAVELENGTH AND INCIDENCE ANGLES.

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The  $\gamma$ -mercaptopropyl trimethoxysilane (MPTMS) has two reactive groups: the methoxy (-OCH<sub>3</sub>) which hydrolyses and form covalent bonds with both the siloxane network and the surface oxide of ferric alloys, and a second reactive thiol group (SH), which reacts forming strong covalent bonds with Ag, Au, Pt y Cu. The layers grown by hydrolysis and condensation are used as "primer" for the adhesion of anticorrosion coatings.

On the other hand MPTMS is also used in different applications as sensors, and microelectronic.

Previous work had used ellipsometry by assuming a MPTMS non absorbing films, optical absorption  $k \approx 0$  [1-7]. However the presence of pores can produce a small increase of  $k$ .

A programme is developed to calculate the optical parameters (refraction indices,  $n$  and  $k$ , and the thickness  $d$ ) assuming an isotropic and homogeneous film. The difference between the experimental ellipsometric parameters  $\Delta$  and  $\psi$  and the theoretical values of  $\Delta$  and  $\psi$  predicted by the Drude equations, the error function  $F$ , is minimised. The global treatment of the measurements (obtained at different wave lengths, in the region 400 y 700 nm, and at different incident angles, 65, 69 y 74 degrees) increases the precision of the calculated optical parameters leading to a univocal mathematical solution which becomes independent of the initial parameters used in the fitting.

The coatings are prepared by three similar deposition steps. The first deposit shows very high porosity ( $n = 1.2$ ) that decrease after the second deposition step ( $n = 1.4$ ). The calculated thicknesses are about 100, 300 nm. A decrease from 8 % to 4 % of the MPTMS concentration of the methanol solution produce a significant increase in the porosity of the layer obtained in the first deposition step.

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