

Área: FIS

## Cold Plasma Treatment on Magnesium AZ31 Alloy: Improving Coating Adhesion and Corrosion Resistance

Vitor Hugo Schweighofer da Silva<sup>1</sup> (IC), Thiago Ferreira da Conceição<sup>1</sup> (PQ)\*, Nito Angelo Debacher<sup>1</sup> (PQ)  
[hugo.schweighofer@grad.ufsc.br](mailto:hugo.schweighofer@grad.ufsc.br); [thiago.conceicao@ufsc.br](mailto:thiago.conceicao@ufsc.br)

<sup>1</sup>Chemistry Department, UFSC;

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### Highlights

#### Cold Plasma Barrier Discharge Applied to Magnesium AZ31: Improving Coating Adhesion and Corrosion Resistance

Cold plasma (DBD) was applied to AZ31 magnesium substrates to modify surface energy and improve paint adhesion. Short exposures (2 min) reduced corrosion rate, but excessive porosity limited protection performance.

### Resumo/Abstract

This study investigates the influence of cold plasma treatment by **dielectric barrier discharge (DBD)** on the **anticorrosive performance of commercial paints** applied to **AZ31 magnesium substrates**. The plasma was generated with argon and oxygen at 25 kV in a reduced-pressure chamber.

Hydrogen evolution analysis (Figure 1) demonstrated that samples exposed for **2 minutes** exhibited the **lowest corrosion rate** among all tested conditions ( $0.6176 \text{ mm year}^{-1}$ ), while longer exposures increased the rate due to excessive surface activation. The subsequent electrochemical impedance results indicated that plasma-treated samples presented slightly lower impedance compared with untreated ones, suggesting increased porosity of the coated film.

Despite the absence of a consistent anticorrosive enhancement, plasma treatment promoted more reproducible impedance profiles over prolonged exposures, highlighting its potential for surface modification and adhesion improvement in protective coatings.

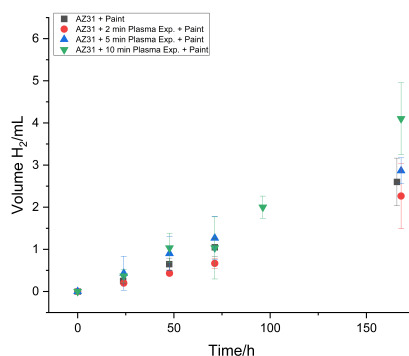


Figure 1 – Hydrogen evolution curves for samples treated for 2, 5 and 10 minutes

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