

Graphene Oxide Coatings of Metal Surfaces for enhanced corrosion resistance

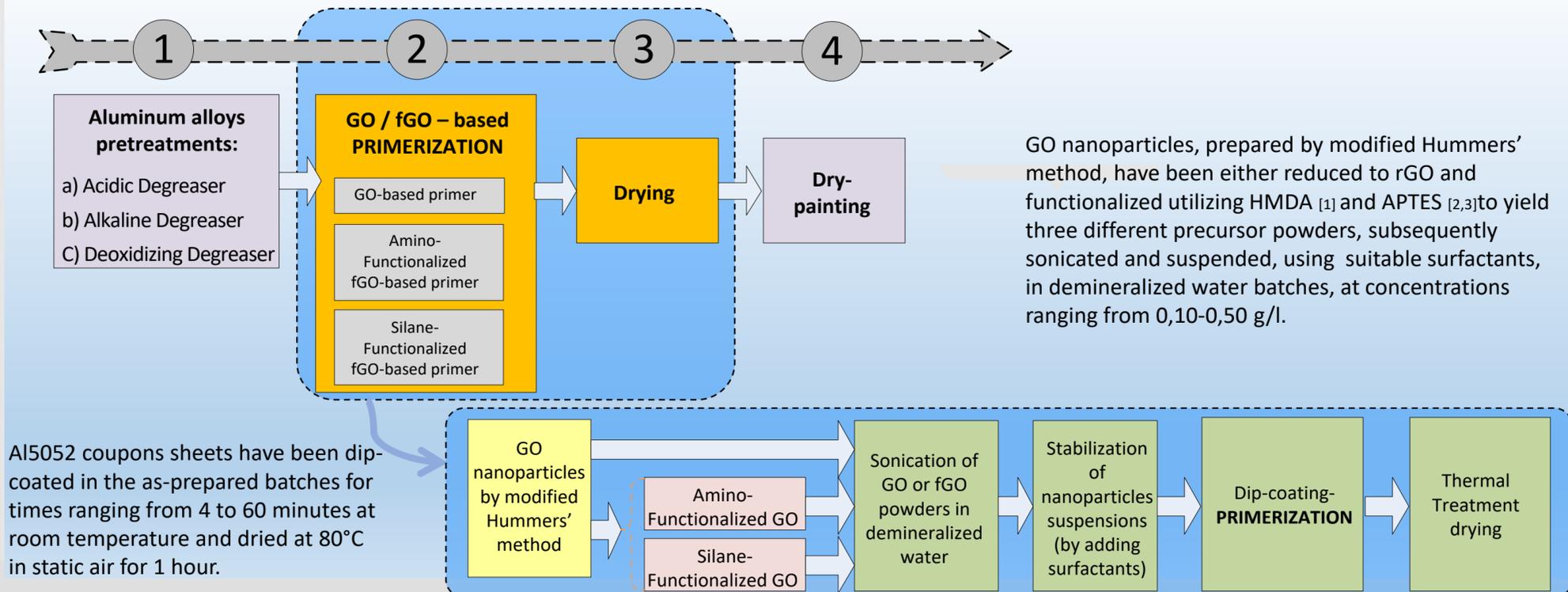
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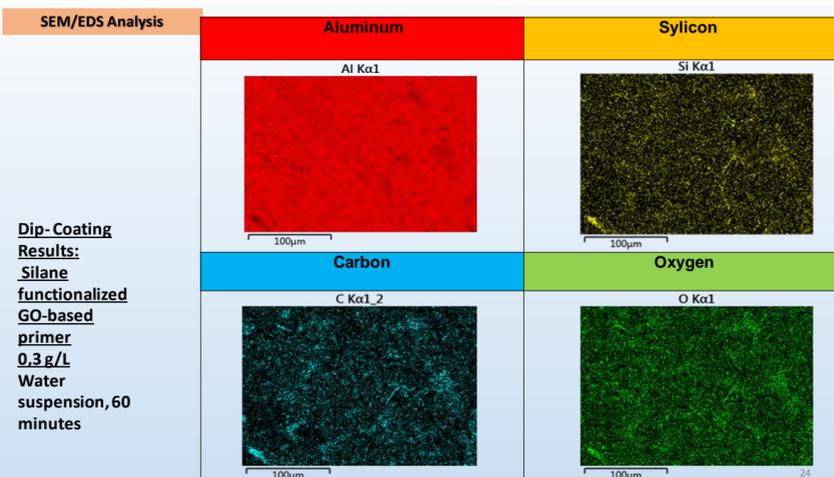
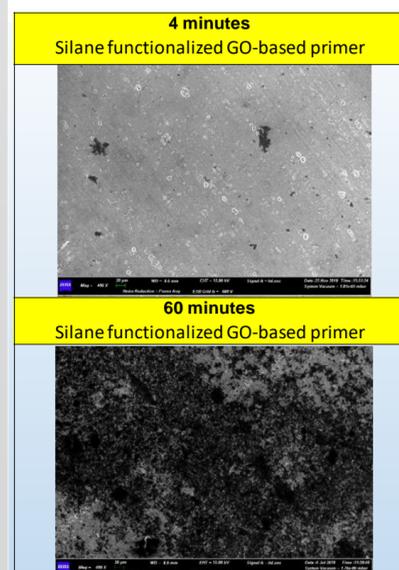
Introduction

Among construction materials, aluminum alloys play a significant role in architectural applications as decorative panels and external fittings. Regarding aluminum alloys manufacture a critical issue is represented by the chemical pre-conditioning process of the surfaces before painting, operated by harmful chemical treatments based on Cr6+ salts, which utilization has been recently banned by the EU commission. Aim of this work is to report on an innovative and environmentally-sustainable “primerization process” of the aluminum metal surfaces by GO based-coating.

EXPERIMENTAL SET-UP: PRIMERIZATION PROCESS DESCRIPTION (STEP-BY-STEP)



Results



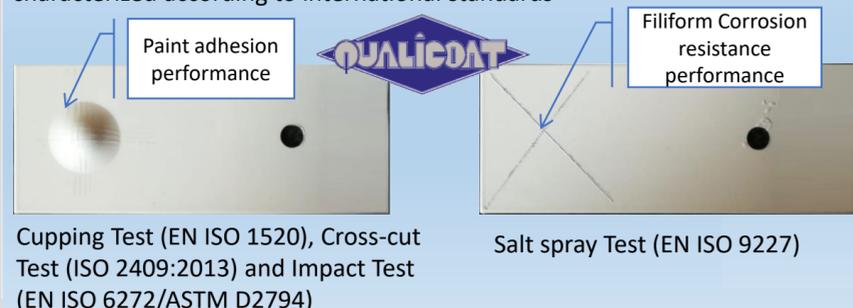
Analisi SEM: Campione AT

Slice	Total Area (µm²)	% Area-Coating
Sample AT	217889,28	77

Microstructural characterization on both the as-prepared powders and coated Al sheets, carried out by Scanning Electron Microscopy (SEM) exhibited coverage percentages of the bare Al surface ranging from 20% to 80% depending on the functionalization technique.

Best results in terms of both stability of the batch suspensions and amount of metal coverage have been obtained by APTES-functionalized GO at concentrations of 0,30 g/l and 10 minutes immersion time.

Coated Al samples have been dry-painted according to industrial-grade procedures, and characterized according to international standards



CONCLUSIONS

A silane-functionalized GO-based dip-coating treatment for aluminum alloys substrates has been developed and characterized, and its performances as a primer for dry painting applications have been tested according to international standards. The presence of the as-prepared fGO-based primer demonstrated excellent paint adhesion and exhibited corrosion resistance properties.

Some References

- [1] F.V. Ferreira et al, Functionalized graphene oxide as reinforcement in epoxy based nanocomposites, Surfaces and Interfaces 10 (2018) 100–109
- [2] Wei Li, Fei Xue & Qiang Li. Modification of bismaleimide resin by using γ-aminopropyl triethoxysilane functionalised graphene oxide. Plastics, Rubber and Composites, 47:5, 187-191
- [3] Mohsin AliRaza et al., Corrosion study of silane-functionalized graphene oxide coatings on copper, Thin Solid Films Volume 663, 1 October 2018, Pages 93-99