SiO_2 nanoparticle/Polymer composite as anticorrosive coating for A-36 Steel

Material Research

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Abstract

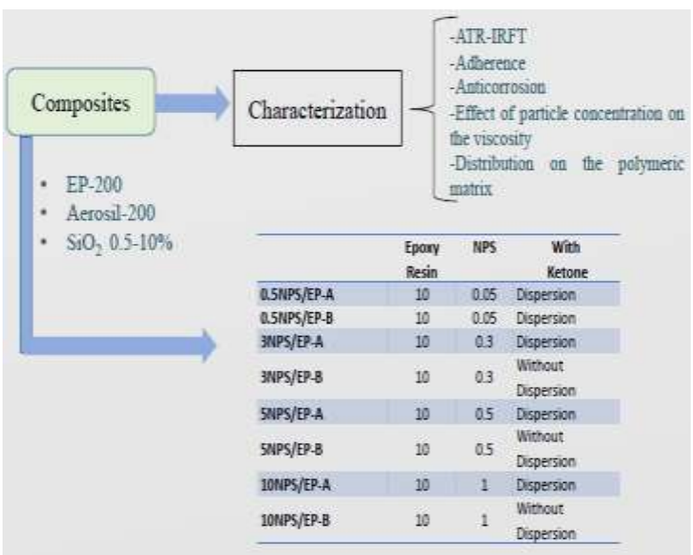
Automotive paint is used on the surface of cars, to decorate or beautify the vehicle. However, one of its main functions is to prevent metal corrosion. The proposal that was developed was to investigate the anticorrosive properties of a primer based on epoxy resin with nano-silica particles (NPS). NPS/Polymer coatings were deposited on A-36 steel plates and its efficiency as anticorrosive coating was determined; as well as coating properties such as adhesion, finish and durability before Accelerated aging tests simulating weather conditions of humidity and heat.

Introduction

To prevent corrosion in metallic materials, there are different alternatives, including anticorrosive coatings [1-3]. Currently, nano-composites have been proposed, materials formed by the dispersion of inorganic particles with size or structure in the nanometer range in an organic phase; such as polymeric matrices [4].

Among the inorganic phases that have been added to the polymeric matrices for their reinforcement, silicon dioxide (SiO_2) is the most suitable due to the properties of silica (inert, high thermal and mechanical stability), so this addition aims to retard corrosion. Therefore, in this work is reported the characterization and anticorrosion behavior of SiO_2/EP composites as anticorrosive coating for A-36 steel.

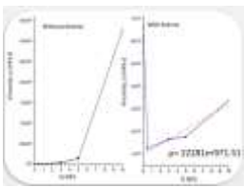
Materials and methods



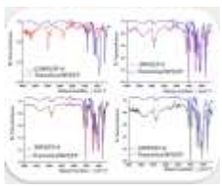
	Epoxy Resin	NPS	With Ketone
0.5NPS/EP-A	10	0.05	Dispersion
0.5NPS/EP-B	10	0.05	Dispersion
3NPS/EP-A	10	0.3	Dispersion
3NPS/EP-B	10	0.3	Without Dispersion
5NPS/EP-A	10	0.5	Dispersion
5NPS/EP-B	10	0.5	Without Dispersion
10NPS/EP-A	10	1	Dispersion
10NPS/EP-B	10	1	Without Dispersion

Results

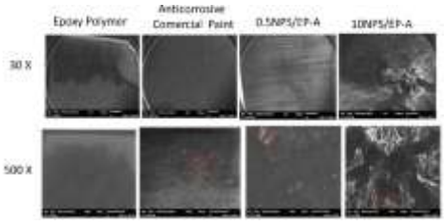
Effect of the NPS concentration Composite



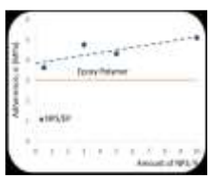
NPS/Epoxy Polymer



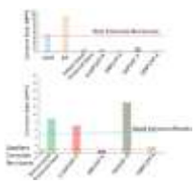
NPS dispersion into epoxy resin



Adherence for NPS/EP



Corrosion rate for NPS/EP-A



Conclusions

SiO_2 is a good anticorrosive agent, it markedly increased properties and parameters such as adherence (19 to 68%) and, above all, resistance to corrosion. The coating that presented the best results in the tests carried out in this project, especially in the corrosion tests, was that of 3% silica with acetone as solvent.

Future of research

Conferring properties such as stiffness and thermal stability to materials while preserving their flexibility, ductility, and processability brings diverse applications in various fields of industry and research.

Acknowledgments

The authors are grateful for the financial support granted by the Research and Postgraduate Secretariat of the National Polytechnic Institute through the project SIP-20221172.

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DOI: 10.35429/S.2022.1.4.13.25

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