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Towards Self-healing Coating Based Polymeric Nanocomposite for Surface Protection

The strategic integration of nanomaterials into polyurethane-based coatings offers considerable improvements with metal oxide nanoparticles providing enhanced properties to the coatings. This approach aims to contribute insights for developing materials in surface protection within demanding environments, fostering innovation in the design of materials with self-healing properties. To enhance the self-healing properties of nanocomposite coatings based on polyurethane by leveraging the influence of titanium dioxide and silicon nanoparticles (TiO_2-SiO_2) because they have proven to be an effective filler material to improve the mechanical properties of many polymeric systems[1]. Thus, coatings are engineered to bestow mechanical strength and self-healing properties, prolonging lifespan and enhancing performance in various industrial and technological applications[2].

In this research, polymeric nanocomposites were prepared and characterized to understand their performance for surface protection subjected to mechanical damage. The nanocomposites based on metal oxide nanoparticles and polyurethane were prepared using an in-situ process, and the coatings were deposited via spin coating. The chemical and surface properties guided the preparation of the nanocomposite coatings.

Keywords

Coatings, Self-healing, Polymer Nanocomposite, Metal oxide nanoparticles

Reference

1. Rahman, M. T. et al. Study on the mechanical, electrical and optical properties of metal-oxide nanoparticles dispersed unsaturated polyester resin nanocomposites. (2019).

2. Choi, K. et al. Properties and Applications of Self-Healing Polymeric Materials: A Review. Polymers (2023).

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