

On the study of novel self-healing coating: Micro/nano capsule synthesis, coating preparation and property investigation

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Abstract

In the present study, the preparation of microencapsulated epoxy and its curing agent and evaluation of this two-component repair system for producing self-healing epoxy coating, with the objective of improving healing efficiency is reported. Epoxy contained microcapsules were prepared by in situ polymerization of urea-formaldehyde resin to form shell over epoxy resin droplets. Chemically and thermally stable nano-porous containers have been synthesized to store DETA as a reactive agent for self-healing epoxy based coatings. The optimal process parameters for synthesizing the micro/nano capsules were selected. The microcapsules were incorporated into the paint formulations just before application. The filled epoxy coatings were prepared by uniformly mixing of the microcapsules together with the mixture of EPON 828 and DETA. When cracks were initiated or propagated in the coating, the neighbor microencapsulated epoxy and DETA would be damaged and released. As a result, repair of the cracked sites is completed through curing of the released epoxy. Micro/nano capsules and final coatings were characterized. All the obtained results show that the prepared self-healing coatings could be suitable for using in different applications.

Keywords: self-healing coating, micro/nano capsule, epoxy, DETA, HGM.

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