

UNIVERSITI TEKNOLOGI MARA

**SELF HEALING POLYESTER-GRAPHENE
PRIMER COATING VIA MICROCAPSULE ON
ITS MECHANICAL, ADHESION AND
CORROSION PROPERTIES**

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degree of

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Microcapsules was successfully synthesized by in-situ polymerization prepared for unsaturated polyester filled graphene for primer application. The objective of this study, was to investigate the mechanical, adhesion and corrosion properties with different graphene loading (0%, 1%, 3% and 5%) filled in unsaturated polyester and to determine the self healing properties via microcapsules on the unsaturated polyester-graphene coating for primer coating application with different microcapsules loading (1, 3 and 5wt%). Mechanical properties that conducted was hardness test, while for adhesion properties testing are pull out test and contact angle measurement. The corrosion properties that was investigate are immersion test and Tafel polarization method. For hardness test, the result obtain 4H regardless the loading of graphene. Pull out test has been observed for UPE-GR and UPE-GR/MC shows the same adhesion strength because of addition graphene that have high properties and it does not affect during the adhesion testing. The immersion testing was immersed in two different medium which is 5wt% NaCl and seawater solution. The lowest corrosion occur on the 5% UPE-GR/MC because of high microcapsules loading because the microcapsules scratch at the 'X' marks. The Tafel Polarization method was also conducted to determine the corrosion rate and polarization resistance. The corrosion rate are inversely proportional so, when the corrosion rate high, the polarization resistance will low. 3%UPE-GR/MC gives the lowest corrosion rate 0.268mmpy and the polarization resistance are 186.96 Ω . As for conclusion, the incorporation of self healing polyester-graphene into the primer coating improve mechanical, adhesion and corrosive properties and the optimum coating found was at 3%UPE-GR/MC.

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