

MICROSTRUCTURE STUDIES OF BIO-WATER-BASED COATED MATERIAL FOR METAL EXPOSED IN VARIOUS CORROSION ENVIRONMENT



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1. Letter of Report Submission

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Penolong Naib Canselor (Penyelidikan)
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Ybhg. Prof.,

LAPORAN AKHIR PENYELIDIKAN “MICROSTRUCTURE STUDIES OF BIO-WATER-BASED COATED MATERIAL FOR METAL EXPOSED IN VARIOUS CORROSION ENVIRONMENT”

Perkara di atas adalah di rujuk.

2. Bersama-sama ini disertakan 2 (dua) naskah dan satu salinan *softcopy* dalam bentuk CD untuk Laporan Akhir Penyelidikan bertajuk “*Microstructure studies of bio-water-based coated material for metal exposed in various corrosion environment*”.

Sekian, terima kasih.

Yang benar,



DR JUNAIDAH JAI
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5. Report

5.1 Proposed Executive Summary

The basic formulation of paint consists of a pigment, binder, solvent and additives. Nowadays, all of the components in paint are made from hazardous chemicals which are harmful to the environment. One of the most important aspects in paint formulation is solvent. Solvent is used to carry the solid components of paint allowing consistency of application by brush, roller, and spray or dipping. The choice of solvent also affects the flow of the paint after it has been applied so that the film develops the correct surface appearance. The paint film wets the substrate to which it has been applied thus maximizing adhesion to the surface. These commonly used solvent are organic chemicals which are harmful to the environment and thus leading to the problem in the application of the paint due to the hazardous constituents. Organic solvent based paints are still a serious problem for painters in the construction sector and that there are no general indications, that the problems are going to be solved. On top of this, it showed that painters are at risks for heavily exposure to organic solvents, for instance floor treatment and painting steel constructions. The bio-water based coated material is based from palm oil methyl ester as the solvent. Palm oil methyl ester is environmental friendly and does not contain any volatile organic compounds which are harmful to the environment since it is made of 100% vegetable origin.. It is also an odourless solvent. The formulation of the bio-water-based consists of a pigment, binder, additives and palm oil methyl ester. The formulation of the bio-water-based coating material for metal will be optimized by testing on the adhesion and corrosion test in various corrosive environments. Due to this matter, microstructure studies of the bio-water-based coated material for metal exposed in various corrosive environments will be conducted.

5.2 Enhanced Executive Summary

Epoxy coatings are highly in demand due to their excellent corrosion protective properties. Currently, raw materials for epoxy coatings mainly originate from diglycidyl ether of bisphenol A (DGEBA), a compound derived from petrochemicals. However, the health concerns associated with bisphenol A combined with the limited supply of petroleum are driving researchers to look for alternative raw materials. Due to the versatility of oleochemistry, plant oils are considered as potential alternative resources to generate more environmentally-friendly coating formulations. This study aims to investigate the possibility of developing a coating material for metal surfaces using epoxidized palm olein (EPO) and subsequently evaluate the resulting coating film's properties and performance. In this study, EPO/epoxy coatings were initially formulated using various ratios of EPO and commercial epoxy resin based on diglycidyl ether of bisphenol A (DGEBA). Coatings were applied on mild steel

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