

Acrylic Epoxy/Polyethylene Glycol/Graphene Oxide Nanocomposites for Antibacterial Coating Applications

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ABSTRACT

The objectives of this research are i) to synthesize graphene oxide (GO) nanomaterial and acrylic epoxy/polyethylene glycol/GO (AE/PEG/GO) nanocomposite; ii) to characterize the resulting samples based on UV-Vis spectroscopy, FTIR spectroscopy, XRD, and SEM; and iii) to determine the anti-bacterial properties of the resulting nanocomposite against *S. aureus* and *E. coli* bacteria. This is an experimental research. In general, the method of this research begins with the preparation of GO using the modified Hummers method assisted by microwave and preparation of AE/PEG/GO nanocomposite. Next, various characterizations are carried out on the resulting nanomaterials using UV-Vis spectrophotometer, FTIR spectrometer, XRD, and SEM tests. Finally, anti-bacterial tests are carried out against *S. aureus* and *E. coli* bacteria using the AE/PEG/GO nanocomposite. The GO produced is in the form of black powder. The UV-Vis test result for the GO sample shows a shoulder peak at around a wavelength of 230 nm. The XRD test result of the GO sample shows a sloping peak around 2θ at 10° . The FTIR test result of the GO sample shows functional groups of O-H, C-H, C=O, and C=C. SEM test result shows the morphology of GO in the form of thin flakes stacked on top of each other. The XRD result of the AE/PEG/GO sample shows a sloping and wide peak at 2θ at around 21° . The FTIR result of the AE/PEG/GO sample shows functional groups of C-H, C=O, C-H, C=C, and C-H. Meanwhile, the surface morphology of AE/PEG/GO indicates chunks of GO material embedded on the AE/PEG layer. The results of the antibacterial test against *S. aureus* using AE/PEG/GO produce the largest diameter of inhibition zone (DIZ), namely: 3.8 mm, followed by AE/PEG and positive control (chloramphenicol), 3.2 mm and 2.25 mm, respectively. In addition, the results of the antibacterial test against *E. coli* show that the positive control (chloramphenicol) has the largest DIZ, namely: 6.54 mm, followed by AE/PEG/GO and AE/PEG of 2.2 mm and 2.86 mm, respectively.

Kata Kunci: GO, EA/PEG/GO nanomposite, antibacterial coating