

Optimization of Graphene Oxide/Polyethylene Glycol Nanocomposites as Antibacterial Coatings in the Food Packaging Industry

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ABSTRACT

The objectives in this Colloids and Nanomaterials Research Group (RG) research were i) to synthesize graphene oxide (GO) materials, ii) to characterize GO to synthesize *polyethylene glycol*/GO (PEG/GO) by varying the composition of GO and PEG, and iv) to determine the anti-bacterial properties of the resulting nanocomposites against *S. aureus* and *E. coli* bacteria. In general, the method in this research began with the manufacture of GO nanomaterials using the microwave modified Hummers method. Furthermore, various characterizations of GO nanomaterials were carried out using UV-Vis spectrophotometer, FTIR spectrometer, SEM, and anti-bacterial tests. Then, PEG/GO nanocomposites were synthesized with various composition of the GO. Furthermore, the nanocomposite anti-bacterial test was carried out against *S. aureus* and *E. coli* bacteria. The results of the UV-Vis characterization of GO produced an absorption peak at a wavelength of 257 nm and variations of GO on the PEG/GO composite (GO 5 mg, 50 mg, 100 mg, and 300 mg), respectively, produced absorption peaks at wavelengths of 279 nm, 278 nm, 278 nm, and 273 nm. The results of the anti-bacterial test showed that the diameter of the inhibition zone that had the best anti-bacterial effect after an incubation period of 24 hours against *E. coli* and *S. aureus* occurred in the PEG/GO (5 mg) variation with 11 mm and 13 mm inhibition zones. Based on the provisions of an anti-bacterial agent, the PEG/GO (5 mg) variation was included in the criteria for strong inhibition with a diameter of 10 mm - 20 mm.

Kata Kunci: *graphene oxide, polyethylene glycol, anti-bacterial coatings*