

ABSTRAK

SINTESIS DAN KARAKTERISASI NANO-KOMPOSIT S/CaO/nGO (0,375/1 dan 0,75/1) SERTA UJI AKTIVITAS ANTIBAKTERI DAN ANTIJAMUR DENGAN BANTUAN IRADIASI SINAR TAMPAK

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Dalam penelitian ini, CaO dipreparasi dari limbah cangkang telur ayam melalui proses kalsinasi pada suhu 900 °C dan nano grafena oksida (nGO) dipreparasi menggunakan metode *Hummers*. Selanjutnya, nano-komposit S/CaO/nGO dibuat melalui proses impregnasi menggunakan alat *ultrasonic cleaner* dengan dua variasi perbandingan yaitu 0,375/1 dan 0,75/1. Analisis *X-Ray Diffraction* (XRD) menunjukkan nano-komposit berukuran 82,08 nm dan 41,86 nm. Analisis *Diffuse Reflectance Spectroscopy* (DRS) menunjukkan nilai energi *band gap* sebesar 0,81 eV dan 0,87 eV. Nano-komposit S/CaO/nGO dengan variasi perbandingan 0,375/1 dan 0,75/1 mempunyai kemampuan sebagai antimikroba baik terhadap bakteri *E.coli*, *Bacillus sp.* maupun jamur *Candida albicans*. Uji antimikroba menggunakan metode difusi sumuran dengan penyinaran *visible*, terdapat peningkatan zona hambat pada nano-komposit S/CaO/nGO 0,375/1 dan 0,75/1. Penyinaran yang optimum uji antibakteri terdapat pada waktu 30 menit dengan zona hambat untuk uji bakteri *E.coli* masing-masing sebesar 8 mm dan 7 mm. Lalu, untuk uji bakteri *Bacillus sp* sebesar 10 mm dan 9 mm. Sedangkan, penyinaran yang optimum uji antijamur terdapat pada waktu 45 menit dengan zona hambat untuk uji jamur *Candida albicans* masing-masing sebesar 7 mm dan 6 mm.

Kata Kunci: S/CaO/nGO, *E.coli*, *Bacillus sp.*, *Candida albicans*

ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF S/CAO/NGO NANO-COMPOSITES (0.375/1 AND 0.75/1) AND ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY TEST WITH THE HELP OF VISIBLE LIGHT IRRADIATION

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In this research, calcium oxide (CaO) was synthesized from chicken eggshell waste through a calcination process at 900 °C, while nano-graphene oxide (nGO) was prepared using the Hummers method. Subsequently, the S/CaO/nGO nanocomposite was fabricated via an impregnation process assisted by an ultrasonic cleaner with two mass ratios: 0.375/1 and 0.75/1. X-ray Diffraction (XRD) analysis revealed that the resulting nanocomposites had particle sizes of 82.08 nm and 41.86 nm, respectively. Diffuse Reflectance Spectroscopy (DRS) analysis indicated that the band gap energies were 0.81 eV and 0.87 eV. The S/CaO/nGO nanocomposites at both ratios exhibited antimicrobial activity against *Escherichia coli*, *Bacillus sp.*, and the fungus *Candida albicans*. Antimicrobial testing using the well diffusion method under visible light irradiation showed increased inhibition zones for both the 0.375/1 and 0.75/1 nanocomposites. The optimum irradiation for the antibacterial test was found at 30 minutes with an inhibition zone for the *E.coli* bacteria test of 8 mm and 7 mm, respectively. Then, for the *Bacillus sp* bacteria test of 10 mm and 9 mm. In contrast, optimal antifungal activity against *Candida albicans* was achieved after 45 minutes of irradiation, with inhibition zones measuring 7 mm and 6 mm for the respective nanocomposite ratios.

Keywords: S/CaO/nGO, *E.coli*, *Bacillus sp.*, *Candida albicans*