ABSTRAK

UJI AKTIVITAS S/CaO/nGO (0,5/1 DAN 0,875/1) SEBAGAI ANTIBAKTERI (*Bacillus subtilis* DAN *Escherichia coli*) DAN ANTIJAMUR (*Candida albicans*) YANG DIIRADIASI SINAR TAMPAK

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Penelitian ini berhasil mensintesis nanokomposit S/CaO/nGO 0,5/1 dan 0,875/1 serta menguji aktivitas antimikrobanya terhadap bakteri *B. subtilis*, *E. coli* dan jamur *C. albicans* dengan metode difusi sumuran di bawah sinar tampak. CaO disintesis dari cangkang telur menggunakan metode sol gel dan nGO disintesis dari bonggol jagung menggunakan metode Hummers termodifikasi. Sulfur didoping dengan CaO (1/1), kemudian diimpregnasi dengan nGO (0,5/1 dan 0,875/1). Nanokomposit dikarakterisasi menggunakan FTIR, XRD, dan UV-Vis DRS untuk mengidentifikasi gugus fungsi, struktur kristal, dan nilai energi *band gap*.

Hasil analisis FTIR menunjukkan gugus fungsi khas material, XRD menunjukkan ukuran kristal sebesar 50,60 nm dan 42,21 nm, serta nilai energi *band gap* sebesar 1,17 eV dan 0,99 eV. Uji antimikroba dilakukan dengan variasi penyinaran 0, 15, 30, 45, dan 60 menit. Waktu penyinaran optimum pada uji antibakteri dan antijamur adalah 45 menit dan 60 menit. Diameter zona hambat uji antibakteri S/CaO/nGO 0,5/1 dan 0,875/1 pada waktu optimum terhadap *B. subtilis* yaitu 10 mm dan 10,5 mm, sedangkan terhadap *E. coli* yaitu 9 mm dan 9,3 mm. Pada uji antijamur terhadap *C. albicans* S/CaO/nGO menunjukkan zona hambat sebesar 7,4 mm dan 7,9 mm pada masing-masing perbandingan pada waktu penyinaran optimum.

Penelitian ini menunjukkan bahwa peningkatan kadar sulfur dan CaO mampu menurunkan energi celah pita pada nanokomposit, sehingga mempermudah perpindahan elektron dan menghasilkan lebih banyak *Reactive Oxygen Species* (ROS). Penyinaran sinar tampak juga mampu mengaktifkan efek fotokatalitik pada nanokomposit S/CaO/nGO yang berkontribusi terhadap peningkatan diameter zona hambat sebagai indikator efektivitas antibakteri dan antijamur.

Kata kunci : S/CaO/nGO, Antibakteri, Antijamur, Sinar Tampak

ABSTRACT

ACTIVITY TEST OF S/CaO/nGO (0,5/1 AND 0,875/1) AS ANTIBACTERIAL (*Bacillus subtilis* and *Escherichia coli*) AND ANTIFUNGAL (*Candida albicans*) IRRADIATED BY VISIBLE LIGHT

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This study successfully synthesized S/CaO/nGO 0,5/1 and 0,875/1 nanocomposites and tested their antimicrobial activity against *B. subtilis*, *E. coli* and *C. albicans* fungi by the pitting diffusion method under visible light. CaO was synthesized from eggshell using sol gel method and nGO was synthesized from corncob using modified Hummers method. Sulfur was doped with CaO (1/1), then impregnated with nGO (0,5/1 and 0,875/1). The nanocomposites were characterized using FTIR, XRD, and UV-Vis DRS to identify functional groups, crystal structure, and band gap energy values.

The results of FTIR analysis showed typical functional groups of the material, XRD showed a crystal size of 50,60 nm and 42,21 nm, and band gap energy values of 1,17 eV and 0,99 eV. Antimicrobial tests were carried out with irradiation variations of 0, 15, 30, 45, and 60 minutes. The optimum irradiation times in antibacterial and antifungal tests were 45 minutes and 60 minutes. The diameter of the inhibition zone in the antibacterial test of S/CaO/nGO 0,5/1 and 0,875/1 at the optimum time against *B. subtilis* was 10 mm and 10,5 mm, while against *E. coli* it was 9 mm and 9.3 mm. In the antifungal test against *C. albicans*, S/CaO/nGO showed inhibition zones of 7.4 mm and 7.9 mm in each comparison at the optimum irradiation time.

This study shows that increasing the levels of sulfur and CaO can reduce the band gap energy of the nanocomposites, making it easier to transfer electrons and produce more Reactive Oxygen Species (ROS). Visible light irradiation is also able to activate the photocatalytic effect on S/CaO/nGO nanocomposites which contributes to an increase in the diameter of the inhibition zone as an indicator of antibacterial and antifungal effectiveness.

Keywords **:** S/CaO/nGO, Antibacterial, Antifungal, Visible Light