

Sintesis Nanokomposit ZnO/Co₂SnO₄ dengan Ekstrak Daun Talas (*Colocasia esculenta* L. Schott) dalam Sistem Dua Fasa serta Aktivitas Fotokatalitiknya Terhadap Malasit Hijau = Synthesis of ZnO/Co₂SnO₄ Nanocomposites using Taro (*Colocasia esculenta* L. Schott) Leaf Extract in Two Phase System and its Photocatalytic Activity of Malachite Green

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Abstrak

Pada penelitian ini, sintesis nanopartikel ZnO, Co₂SnO₄, dan nanokomposit ZnO/Co₂SnO₄ dilakukan secara green synthesis menggunakan ekstrak daun talas (*Colocasia esculenta* L. Schott) dalam sistem dua fasa (n-heksana – air). Kandungan metabolit sekunder yang terdapat pada ekstrak daun talas seperti alkaloid dan saponin akan berperan sebagai sumber basa lemah dan capping agent dalam proses sintesis. Selanjutnya, hasil sintesis akan dikarakterisasi dengan menggunakan Spektrofotometer UV-Vis, Spektrofotometer UV-Vis DRS, Spektroskopi FTIR, X-Ray Diffraction (XRD), dan Transmission Electron Microscopy (TEM). Berdasarkan hasil karakterisasi dengan spektrofotometer UV-Vis DRS didapatkan nilai band gap energy untuk nanopartikel ZnO, Co₂SnO₄, dan nanokomposit ZnO/Co₂SnO₄ masing-masing sebesar 3,08 eV, 1,6 eV, dan 2,44 eV. Nanokomposit ZnO/Co₂SnO₄ diuji aktivitas fotokatalitiknya terhadap malasit hijau. Berdasarkan hasil penelitian, uji aktivitas fotokatalitik nanokomposit ZnO/Co₂SnO₄ memiliki persen degradasi tertinggi pada kondisi optimum dengan berat sebesar 12 mg pada 5,0 x 10⁻⁶ M malasit hijau selama 120 menit di bawah sinar tampak, yaitu sebesar 92,63%.

.....In this research, synthesis of ZnO, Co₂SnO₄ nanoparticles, and ZnO/Co₂SnO₄ nanocomposites were prepared by green synthesis using taro (*Colocasia esculenta* L.Schott) leaf extract in a two phase system (n-hexane – water). The content of secondary metabolites found in taro leaf extract such as alkaloid and saponin were roled as a source of weak base and capping agent in the synthesis process. Furthermore, the synthesis results were characterized by UV-Vis spectrophotometer, UV-Vis DRS spectrophotometer, FTIR spectroscopy, X-Ray Diffraction, and Transmission Electron Microscopy. UV-Vis DRS spectrophotometer characterization shows that band gap energy of ZnO, Co₂SnO₄ nanoparticles, and ZnO/Co₂SnO₄ nanocomposites were 3,08 eV, 1,6 eV, and 2,44 eV, respectively. ZnO/Co₂SnO₄ nanocomposites was applied for its photocatalytic activity to malachite green. Based on research results, the photocatalytic activity test of ZnO/Co₂SnO₄ nanocomposites had the highest degradation percentage of malachite green reached in the optimum condition of 12 mg mass catalyst and 5,0 x 10⁻⁶ M of malachite green concentration for 120 minutes under visible light, which was 92,63%.