

Morfologi, Sifat Optik dan Aktivitas Fotokatalis Pb Doped ZnO dengan Metode Sintesis Kopresipitasi = MORPHOLOGY, OPTICAL PROPERTIES AND PHOTOCATALYTIC ACTIVITY Pb DOPED ZnO PREPARED BY COPRECIPITATION

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Abstrak

Pb doped ZnO disintesis dengan metode kopresipitasi menggunakan prekursor $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ dan PbCl_2 dengan variasi konsentrasi dopant Pb (0.5%, 3%, 3.5% dan 5%) pada kondisi pH 13 serta temperatur pengeringan 100 0C selama empat jam. Sampel dikarakterisasi dengan X-Ray Diffraction (XRD) dan Energy Dispersive X-Ray (EDX) untuk melihat morfologi serta komposisi Pb doped ZnO. Hasil karakterisasi XRD menunjukkan terbentuknya fase utama wurtzite ZnO serta ditemukan fase sekunder PbO. Analisa lebih lanjut menunjukkan perubahan parameter kisi wurtzite ZnO ($a=3.252$, $c=5.216$) serta penurunan ukuran kristal (18 hingga 12 nm) dengan penambahan dopant Pb. Sifat optik Pb doped ZnO dikarakterisasi menggunakan UV-Vis Spectroscopy dan diperoleh penurunan energi celah pita ZnO (3.379 hingga 3.310 eV). Penurunan energi celah pita ZnO mengindikasikan terbentuknya pita tambahan di bawah pita konduksi ketika terjadi substitusi Pb ke dalam matriks ZnO. Kemampuan fotokatalis Pb doped ZnO dikarakterisasi dengan metode Photocatalytic Activity (PCA) menggunakan sinar UV pada rentang 200–800 nm selama 1 jam dan didapatkan efisiensi fotokatalis terbaik pada sampel Pb doped ZnO dengan kadar dopant 3.5%.

.....Pb doped ZnO were synthesized by coprecipitation with $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ and PbCl_2 (0.5%, 3%, 3.5% and 5%) at pH 13 and 100 0C for four hours. Morphology and composition of Pb doped ZnO were characterized by X-Ray Diffraction (XRD) and Energy dispersive X-ray (EDX). XRD spectrum indicated the formation of wurtzite ZnO and PbO. Further analysis showed that lattice parameter of ZnO has changed ($a = 3.252$, $c = 5.216$) and crystallite size has decreased (18 to 12 nm) with the addition of Pb. The optical properties of Pb doped ZnO were characterized using UV-Vis spectroscopy and showed that bandgap energy was decreased (3.379 to 3.310 eV). This indicated the formation of additional bandgap below the conduction band when the substitution of Pb into the ZnO matrix. Photocatalytic Activity (PCA) of Pb doped ZnO photocatalysts were characterized using UV in 200-800 nm for 1 hour and Pb Doped ZnO 3.5% has the best photocatalytic activity.