Sintesis fotokatalis zno dengan variasi komposisi dopant ion Mg2 dan penambahan zeolit alam dan karakterisasinya = Synthesis of zno photocatalyst with variation of Mg2 dopant and natural zeolite addition and its characterization

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Abstrak

Material fotokatalis MgxZn(1-x)O-Zeolite telah berhasil dilakukan dengan metode kimiawi basah melalui teknik presipitasi dengan variasi konsentrasi Mg (2%, 3%, 6%, dan 7.5%). Seng oksida didapat dari serbuk ZnSO4.7H2O, ion Mg2+ dari MgSO4.7H2O, dan zeolit alam dari clinoptilolite. serangkaian pengujian dilakukan untuk mengkarakterisasi sampel. Uji yang dilakukan adalah uji difraksi sinar-X (XRD), Energy Dispersive X-Ray (EDX), dan spektroskopi UV-Vis. Pengujian aktivitas fotokatalisis sampel dilakukan dengan media degradasi metil jingga. Hasil karakterisasi menunjukkan struktur kristal ZnO tetap berbentuk wurtzite hexagonal. Penambahan doping Mg berpengaruh terhadap penurunan ukuran kristalit sekaligus penurunan kisi yang berdampak pada peningkatan energi celah pita dengan rentang 3.31 ? 3.44 eV pada fotokatalis dengan kadar 2% hingga 7.5%. Peningkatan energi celah pita disebabkan pembentukan Fermi level didalam pita konduksi sehingga pita konduksi terangkat dan jarak untuk eksitasi elektron semakin lebar. Fotokatalis ZnO dengan kadar Mg 2% memiliki efisiensi aktivitas fotokatalisis yang paling baik dari semua sampel, begitu pun dengan laju degradasinya.
<hr>Photocatalyst material MgxZn(1-x)O-Zeolite has been successfully synthesized through the precipitation method with variation of dopant Mg content (2%, 3%, 6%, and 7.5%). Zinc oxide was obtained from ZnSO4.7H2O powder, while Mg2+ ion was obtained from MgSO4.7H2O, and natural zeolite from clinoptilolite. The samples were characterized by X-Ray Diffraction (XRD), Energy Dispersive X-Ray (EDX), and UV-Vis Spectroscopy. The photocatalytic activity was tested for methyl orange degradation under UV irradiation. X-ray diffraction showed the prepared ZnO particles were in wurtzite structure. The addition of Mg doping had an effect on crystallite size reduction as well as reduction of lattice parameter. The band gap energy of MgxZn(1-x)O-Zeolite changed within a range of 3.31 ? 3.44 eV with increasing of Mg content from 2% to 7.5%. This enhancement of band gap energy due to the formation of Fermi level inside the conduction band so that the conduction band was lifted and broaden the distance for photoinduced electron to do the excitation. ZnO photocatalyst with 2% Mg content showed the highest efficiency in photocatalytic activity and also the greatest degradation rate of all samples.