Peningkatan aktivitas fotokatalitik nanorod ZnO doping cobalt yang ditumbuhkan diatas substrat kaca = Enhanced photocatalytic activity of cobalt doped ZnO nanorods grown on glass substrates

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Abstrak

Aktifitas fotokatalis nanostruktur ZnO dapat ditingkatkan dengan berbagai cara, termasuk rekayasa struktur elektronika material melalui penambahan atau doping logam transisi. Pada umumnya ZnO doping Co untuk aplikasi fotokatalis disintesis dalam bentuk lapisan tipis atau serbuk, masih sangat sedikit penelitian sintesis nanorod ZnO doping Co yang ditumbuhkan langsung diatas substrat yang lebih praktis dalam aplikasinya. Dalam penelitian ini, nanorod ZnO ditumbuhkan diatas permukaan substrat kaca dengan metode ultrasonic spray pyrolysis dan hidrotermal. Aaktivitas fotokatalitik nanorod ZnO diuji melalui degradasi larutan methylene blue MB dibawah sinar UV.
Hasil karakterisasi menggunakan FESEM, EDX, XRD, UV-Vis, DRS, PL, Raman, dan XPS menunjukkan bahwa doping Co dapat meningkatkan laju degradasi MB. Peningkatan laju degradasi akibat dari peningkatan ukuran nanorod, peningkatan absorbansi dan emisi pada daerah UV serta menurunnya band gap sebagai akibat interaksi antara elektron atom Co dengan elektron atom Zn dan O. Nanorod ZnO doping Co 7 memiliki aktivitas fotokatalitik tertinggi yang mampu mendegradasi 79,73 MB dalam waktu 38 menit.
<hr>The photocatalyst activitity of ZnO nanostructure can be enhanced in various ways, including the modification of electronic structure through the addition of transition metals elements. Generally, Co doped ZnO for photocatalyst applications were synthesized in the form of thin films or powders. It is rarely researchs on the synthesis of Co doped ZnO nanorods grown on the substrates that have more practical for photocatalyst application. In this study, ZnO nanorods were grown on the surface of glass substrates by ultrasonic spray pyrolysis and hydrothermal methods. The photocatalytic activity of ZnO nanorods was performed by degradation of methylene blue MB under UV radiation.
The characterization results using FESEM, EDX, XRD, UV Vis, DRS, PL, Raman, and XPS show that Co doping can increase the degradation rates. This improvement may be due to the increase of nanorods size, the increase of UV absorbance and emissions on and decrease of band gap as a result of exchange interactions between electrons of Co with electrons of Zn and O. ZnO nanorods with doping Co 7 mol has the highest photocatalytic activity that is capable to degrade 79,73 MB within 38 minutes.