

Accepted Manuscript

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PII: S0030-4026(16)30918-4
DOI: <http://dx.doi.org/doi:10.1016/j.ijleo.2016.08.048>
Reference: IJLEO 58065

To appear in:

Received date: 15-6-2016
Accepted date: 22-8-2016

Please cite this article as: C.Dhandapani, R.Narayanasamy, S.N.Karthick, K.V.Hemalatha, S.Selvam, P.Hemalatha, M.Suresh kumar, S.Dinesh Kirupha, Hee-Je Kim, Drastic photocatalytic degradation of methylene blue dye by neodymium doped zirconium oxide as photocatalyst under visible light irradiation, Optik - International Journal for Light and Electron Optics <http://dx.doi.org/10.1016/j.ijleo.2016.08.048>

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Drastic photocatalytic degradation of methylene blue dye by neodymium doped zirconium oxide as photocatalyst under visible light irradiation

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ABSTRACT

Nanocrystalline ZrO₂ and neodymium doped ZrO₂ (Nd - ZrO₂) were successfully prepared by a polymer - assisted, sol-gel method and characterized by XRD, SEM, HRTEM, XPS and UV-Vis techniques. X-Ray diffraction studies revealed the formation of highly crystalline structures of ZrO₂ and (Nd - ZrO₂) samples. SEM images proved the evenly distributed nano - structured, spherically - shaped ZrO₂ particles of size 40 nm, which was reduced to 20 nm, when doped with neodymium. Light absorption properties of the nanoparticles were studied by UV - Vis spectrophotometer. Nd - doped ZrO₂ was having a band gap of 2.8 eV, while that of ZrO₂, was 2.6 eV. Thus, Nd substituted ZrO₂ effected substantial shifting of the absorption edge of zirconium oxide to red and resulting in the enhancement of

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