

Photocatalytic activity of $\text{Ca}_{1-x}\text{Mg}_x\text{Fe}_2\text{O}_4$ nanocrystals

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Perovskite-type oxide materials based on transition metals with d(0) electron configuration such as Nb(V), Ta(V), and Ti(IV) are efficient photocatalysts for overall water splitting with high quantum yields. However, the large band gaps of these materials (ca. 3.8–4.0 eV) are not suitable for the visible light photocatalysis. Very recently we observed that photocatalyst consisting of nanocomposites are efficient in utilization of visible light photons. Hence we report here a study on the synthesis and application of nanocrystalline ternary metal-oxide. Here, we report the new finding that nanocrystalline $\text{Ca}_{1-x}\text{Mg}_x\text{Fe}_2\text{O}_4$, viz. a p-n type photocatalysts have activity for the photoreaction of water under visible light irradiation. We characterized the optical properties of nanocrystalline $\text{Ca}_{1-x}\text{Mg}_x\text{Fe}_2\text{O}_4$ by UV-vis diffuse reflectance spectroscopy and X-ray diffraction.