

Photoluminescence and photocatalytic properties of M-doped TiO₂ (M = Co and Cr) materials

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Recently, some UV-active oxides turned into visible-light photocatalysts by substitutional doping of metals as in (Fe-, V-, or Mn-)-TiO₂ and Ni_xIn_{1-x}TaO₄, reduced TiO_x (x < 2), and anion doping with N, C and S, as in TiO_{2-x}N_x, TiO_{2-x}C_x, TaON and Sm₂Ti₂O₅S₂. Despite such reports there are no reports on the evolution of H₂ under visible irradiation from Metal doped-TiO₂ nanoparticles.

Here, we report the new finding that the metal-doped TiO₂ nanoparticles have a activity for the photoreaction of water under visible light irradiation. We characterized the electronic structure of Cr-doped TiO₂ nanoparticles by FP-LAPW, and characterized them with UV-vis diffuse reflectance spectroscopy (UV-vis DRS) and X-ray diffraction (XRD). We obtained excitation and emission spectra of Cr-doped TiO₂ nanoparticles from visible light to near infrared region at room temperature. This report describes the characteristics of Cr-doped TiO₂ fabricated by the hydrothermal synthesis method and their photocatalytic activity for water splitting under visible light irradiation.