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Visible-light active TiO_2 for microwave assisted photocatalytic reactions using mercury electrodeless discharge lamp

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Titanium dioxide is a well-known photocatalyst. The photocatalytic reactions using active TiO_2 have been successfully developed as a method for remediation of contaminated water and purification of polluted air. The research is aimed to prepare a visible-light response photocatalyst via transition metals doping. Titanium dioxide nanoparticles doped with various ions of transition metals M^{n+} (M = Fe, Cr, Mn, Co, V, Cu, Ni, Ag) were prepared by using the sol-gel method based on hydrolysis of titanium butoxide. A series of M^{n+} doped TiO_2 catalysts were examined by XRD, UV-Vis, AFM and SEM. Compared with pure titania, the UV-Vis spectra of some M^{n+} doped titania show significant absorption in visible region. The photocatalytic activity was evaluated by the degradation of mono-chloroacetic acid in a microwave field using mercury electrodeless discharge lamp. The degradation efficiency of MCAA on some M^{n+} doped TiO_2 was higher than those of pure TiO_2.