Rattana Phatinavin 2009: Synthesis of Samarium Doped TiO_2 Catalysts for Photodegradation of Polycyclic Aromatic Hydrocarbons (PAHs). Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Associate Professor Apisit Songsasen, Ph.D. 147 pages.

TiO_2 catalysts have been improved for photodegradation of PAHs via doping with Sm. All catalysts were synthesized by sol-gel method with various percentage of Sm weight at different calcination temperatures. The phase of TiO_2 catalysts were investigated by XRD, TGA and Raman spectroscopy. The surface structure of catalysts were proposed by SEM/EDX. Particle size and morphology were analyzed by TEM. Surface area and pore size distribution were calculated by BET method. XRD results indicated that all prepared catalysts were anatase phase. Raman results showed that bridging Sm-O-Sm bond was not form, but Sm ion possessed as interstitial species in anatase hole of TiO_2. XRD results also showed that Sm doping could inhibit the phase transformation from anatase to rutile which occurred at high calcination temperature. Additionally, as increase amount of Sm doping, particle size decrease as a result. These indicated that Sm doping could hinder the increase of crystallite size during calcinations, supported by TEM data. SEM/EDX and TEM results comfirmed that all Sm ion disperse homogeneity in TiO_2 structure. UV-Vis/DR results showed that Sm doping could reduce band gap energy and extended the photoresponse of TiO_2 in visible light region. These improved properties could enhance the photocatalytic activity of TiO_2 under visible light.

To compare the activity of all prepared catalysts, the photodegradation of each PAHs were carried out in photoreactor under visible light with optimized condition. The degradation rate of phenanthrene and benzo[a]anthracene using Sm doping TiO_2 were faster than using undoped TiO_2 and commercial P-25 TiO_2. Sm could improve the catalytic activity of TiO_2 for photodegradation of PAHs compounds.

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