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

Preparation and Characterization of Ordered TiO₂ Photocatalysts: Films and Mesoporous Structures

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Abstract: Two different ordered TiO₂ structures were prepared as sol-gel films coated on glass and as mesoporous structures in order to study the effect, in 2-D or in 3-D, of bulk size on photocatalytic activity. Multilayer TiO₂ films were coated on glass by the sol-gel dip coating method. The UV-VIS characteristics of the films, with respect to the number of coating layers, were monitored. UV-VIS measurements implied an ordered TiO₂ structure grown on ITO glass. The second approach involved loading TiO₂ in mesoporous SBA-15 powder. Ti-SBA-15 with Ti/Si (mole/mole) ratios between 0.05 and 0.30 were prepared and characterized by XRD and BET. Low-angle XRD results of Ti-SBA-15 samples demonstrated long-range order, and the mesoporous structure of SBA-15 was preserved under all titanium loadings. Wide-angle XRD results of Ti-SBA-15 samples demonstrated no crystallinity for TiO₂ at low Ti loadings (0.05 and 0.10), and the onset of crystal formation at the 0.15 loading. The rutile phase was observed to be the dominant phase for lower loadings (0.20), whereas the anatase phase was dominant at higher loadings (0.25 and 0.30). BET surface areas decreased slightly with the addition of TiO₂ in SBA-15

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