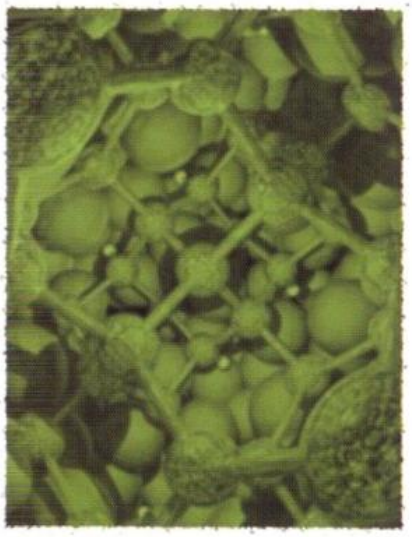

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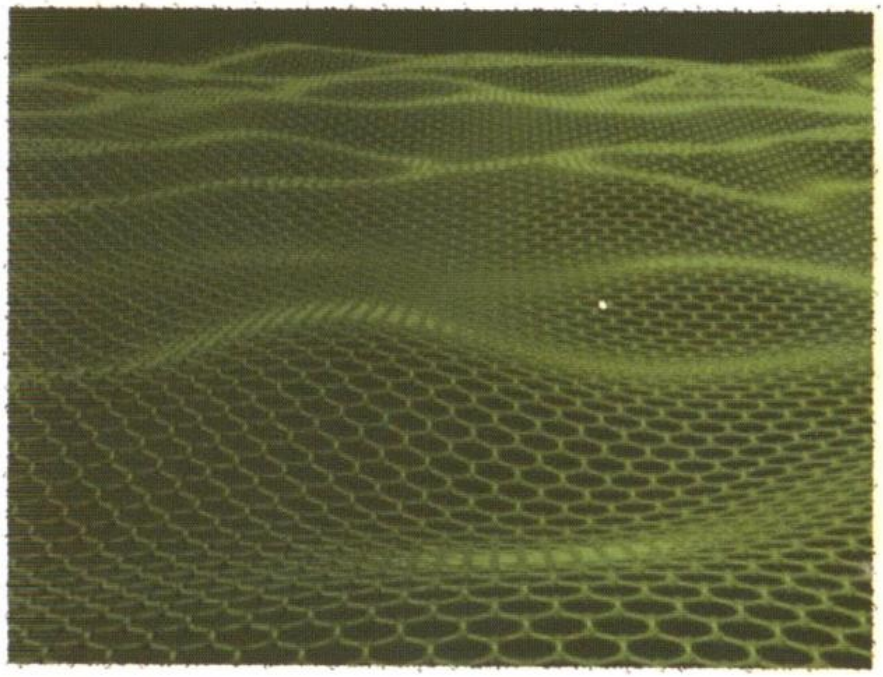

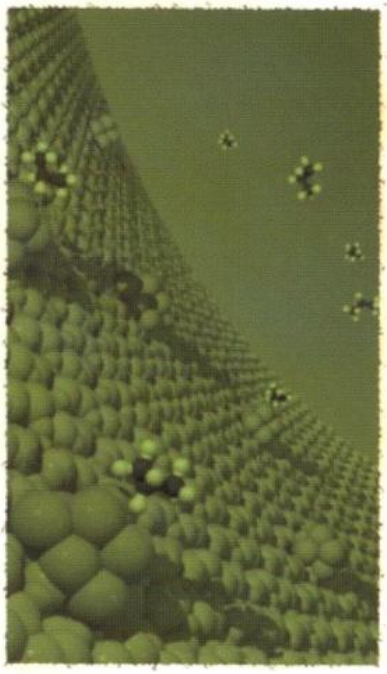

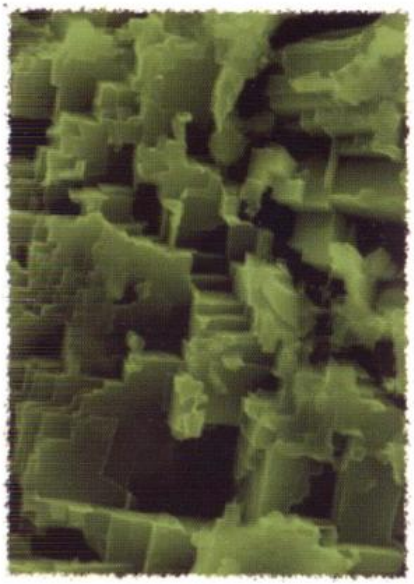

BOOK of ABSTRACTS

- 1P31 -

PHYSICOCHEMICAL PROPERTIES OF NANOSIZED TiO_2 EMBEDDED IN MESOPOROUS SILICA NANOSPHERES

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ABSTRACT

Titania (TiO_2) is a material widely investigated because of its physicochemical properties in catalysis and photocatalysis, photovoltaic cells, batteries, reflective coating, ultraviolet blockers in cosmetic products and many others. In the recent years, the controlled synthesis of nanocomposites of titania has gained enormous interest as quantum yield depends on crystal size and surface morphology, in addition to absorption and diffusion of the target molecules. In order to obtain nanosized TiO_2 particles and to avoid the tendency of agglomeration by the small particles, many researchers have been studying nanocomposites based on mesoporous products as supporting materials [1].

In this work, ordered mesoporous silica nanospheres (MSNs) prepared via sol-gel route [2] are loaded with titania nanoparticles, using Ti(IV) isopropoxide as titanium source. The synthesis of TiO_2/SiO_2 materials with 10 wt.%, 20 wt.%, 30% and 40 wt.% of TiO_2 is described here.

The resulting nanostructures have been investigated in detail using a variety of techniques. Typical samples of pure TiO_2, SiO_2 and their composites were characterized using N_2-physisorption (BET surface area, BJH pore size distribution and total pore volume), X-ray Diffraction (XRD), Small Angle X-ray Scattering (SAXS), Diffuse Reflectance Infrared Fourier Spectroscopy (DRIFT-IR), Diffusive Reflective UV-Vis Spectroscopy (DRUV-Vis), X-ray Photoelectron Spectroscopy (XPS), and imaged using Scanning and Transmission Electron Microscopy (SEM, TEM).

The well-defined porous structures of MSNs may offer a special environment for titania particles, offering unusual morphologies, sizes and environment thus altering the properties of the materials.

The UV absorptions of the nanocomposites were studied and the results discussed. The TiO_2 loading, the particle size, and the surface characteristics are shown to relate to the range and the degree of UV absorption of the composites. The results from all the techniques clearly suggest that the variation of the UV profiles is dependent on the nanostructure of the composites.

REFERENCES

[1] Zhao L.; Yu J.; J.Colloid and Interface Science, 2006, 304, 84-91.

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