Incorporation of Nanostructured ReO3 in Silica Matrix and Their Activity Toward Photodegradation of Blue Methylene

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Abstract: ReO3 were prepared by thermal treatment of the macromolecular Chitosan·(ReCl3)X and PSP-4-PVP·(ReCl3)X precursors. The plasmon band in the visible region for the as obtained ReO3 from their visible spectra was observed at ?max of 640 nm. The nature of the polymeric precursor is acting as a solid state template and influences the size and morphology of the metal oxides. For the first time, the photocatalytic degradation of methylene blue using ReO3 was measured founding a moderated and high activity for ReO3 arise from Chitosan and PSP-4-PVP precursors respectively. The inclusion of ReO3 into SiO2 was performed using a combined solution of the Chitosan and PVP precursors by the sol?gel method. Subsequent pyrolysis of the solid precursors Chitosan·(ReCl3)X(SiO2)y and PSP-4-PVP·(ReCl3)X.(SiO2)y give rise to the nanocomposites ReO3//SiO2. The as obtained ReO3 nanoparticles inside SiO2 are small as 1 nm. The ReO3 nanoparticles are distributed uniformly inside the matrix of SiO2, leading to stable semi porous materials suitable for high temperature catalytic application. The composites ReO3/SiO2 exhibit a moderate photocatalytic activity toward the degradation of methylene blue and similar to that of ReO3. Graphic Abstract: [Figure not available: see fulltext.].

Blue methylene

Nanostructured ReO3

Photodegradation

Aromatic compounds

Chitosan

Nanocomposites

Nanoparticles

Photocatalytic activity

Photodegradation

Porous materials

Silica

SiO2 nanoparticles

Sols

Blue methylene

Catalytic applications

Combined solution

High temperature

Nano-structured

Photo catalytic degradation

Polymeric precursors

Solid precursors

Rhenium compounds