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Size and surface design of titania nanoparticles

Hybridization of functional particles with other components has been examined for several objectives including catalysts' design.[1,2] The immobilization of titania particles with solid supports such as clays has been reported.[1,2] For some application, coating of titania particle with silica has been examined.[3] On the other hand, preparation of nanoparticles in nanospaces is a way to obtain well-defined nanoparticles without aggregation/fusion. The preparation of well-defined semiconductor nanoparticles using mesoporous silica as template has been reported.[4-6] The preparation is based on the infiltration of molecular precursor into the pore and the subsequent crystallization in the pore. Anatase nanoparticles with the diameter similar to the pore size of the template (cylindrical mesopore of SBA-15 with the pore diameter of 8 nm) were prepared by the infiltration of titanium alkoxide and the subsequent in-situ crystallization in the mesopore by the calcination.[4] Rutile nanoparticles were obtained by the infiltration of titanium alkoxide and the subsequent crystallization by the reaction with HCl vapor at room temperature.[5] In addition, porous polymer film was utilized to design anatase nanoparticles.[6].

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