Synopsis of Original Research Paper

Synthesis of Monodispersed Cerium Oxide UV-Shielding Material with Plate-like Micro-size Particles and Their Additional Functions Related to Their Morphologies

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Monodispersed spherical, rod-like, and plate-like cerium oxide particles were successfully synthesized by homogeneous precipitation process followed by calcination in air at 400˚C. Monodispersed rod-like cerium carbonate precursor was produced at 70 ˚C for 2 h using the solution without pre-aging treatment, while monodispersed spherical precursor and plate-like precursor were obtained under the same conditions after pre-aging the solution at 25˚C for 72 and 144 h, respectively. In addition, micrometer sized plate-like cerium carbonate hydrate single crystal, $Ce_2(CO_3)_3.8H_2O$, was successfully prepared by another facile precipitation-aging process at room temperature using sodium hydrogencarbonate as precipitate reagent, and could be converted to plate-like cerium oxide CeO_2 by calcination in air at 400˚C. The particle size of $Ce_2(CO_3)_3.8H_2O$ could be controlled by precisely adjusting pH value of the solution and/or adding organic solvents such as ethylene glycol and various alcohols. CeO_2 particles showed the same morphology and slightly decreased particle size compare with those of rod-like, spherical and plate-like precursors. In comparison with commercial CeO_2 nanoparticles, the synthesized plate-like CeO_2 particles showed lower photocatalytic and oxidation catalytic activity, higher slipping characteristic (comfort of use) and higher pearlescent (gloss value) as well as excellent UV-shielding ability, indicating the potential applications as a new type of multifunctional cosmetic materials.