TiO_2 Film Deposition on Binary Particle Mixture using Atmospheric Pressure Plasma Enhanced Chemical Vapor Deposition in a Circulating Fluidized Bed Reactor

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To improve fluidization quality of fine powders (Geldart's group C) in a CFB reactor, a binary particle mixture system was studied with coarse (Geldart's group A, silica gel, 100㎛) and fine powders (silica gel, 28㎛). Titanium oxide films were deposited on binary particle mixture by plasma enhanced chemical vapor deposition (PECVD) in a circulating fluidized bed reactor (CFB) using titanium tetraisopropoxide (TTIP, $Ti(OC_3H_7)_4$) as a source material. Plasma was created by feeding helium and oxygen mixture. TiO_2 film formation by PECVD have been evaluated with various process parameters such as r.f. power, gas flow rate and treatment time. The characteristics of coatings are investigated by X-ray diffraction, SEM, FTIR spectrometer.

As-deposited amorphous TiO_2 thin films were treated by thermal annealing in air ambient at 400~800℃. As increasing temperature, the structure of as-deposited films is converted from a fully amorphous state to a partially anatase crystalline state, which can be confirmed by the appearance of small peaks of (1 0 1), (0 0 4) and (2 0 0) orientation in XRD analysis.