# Atmospheric Pressure Plasma Enhanced Chemical Vapor Deposition of $TiO_2$ Films on Silica Gel Powders in a Circulating Fluidized Bed Reactor

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Uniform $TiO_2$ film deposition on silica gel powders has been developed by using Plasma Enhanced Chemical Vapor Deposition (PECVD) in a Circulating Fluidized Bed (CFB) reactor (18 mm-ID × 1000 mm-high).
$TiO_2$ films on silica gel (100 μm) powders were deposited by using precursor $Ti(O-i-C_3H_7)_4$ (TTIP, 98%, Junsei) and oxygen as a reaction gas. Helium gas (99.999%) was used as a plasma generation gas. The optimum reaction conditions for deposition of $TiO_2$ thin films have been determined with variations of plasma power, oxygen concentration and argon concentration. Argon concentration mainly affect to make a uniform thin films, which has a role to expand plasma volume. Based on the data from scanning electron microscope (SEM), EDS, XPS and Raman scattering spectroscopy analyses, the $TiO_2$ crystals are most evenly distributed on the surface of silica gel powders at argon concentration of 8.18 vol%.