

Synthesis of polyaniline-titanium dioxide hybrid by thermo-polymerization

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Novel properties of hybrid materials can be obtained by the successful combination of parent constituents into single material. Since conductive polyaniline(PANI) shows unique electrical, electrochemical and optical properties and titanium dioxide also has extensive application areas such as solar energy conversion, photo-catalysis and UV protection, it is natural to expect that the hybrid of PANI and TiO₂ should possess excellent characteristics for future applications in various areas. However, it has been reported by many researchers that PANI-TiO₂ hybrids have various detriments in terms of chemical stability and dispersability of PANI.

In this work polyaniline-titanium dioxide(PANI-TiO₂) hybrid particles have been synthesized by utilizing supercritical CO₂ and thermo-polymerization. The aniline has been highly dispersed in TiO₂ through the sol-gel reaction in supercritical CO₂ and subsequent thermo-polymerization at 223°C produce PANI-TiO₂ hybrid particles. The products have been characterized by EC, FT-IR, TGA, SEM, TEM and XRD analyses. The TEM pictures of PANI-TiO₂ hybrid particles show that PANI has been interpenetrated into the structure of TiO₂ and the electrical conductivities of hybrid particles are relatively low values such as $1.10 \times 10^{-4} \text{ S.cm}^{-1}$ at 20°C.