

과산화티탄산 용액을 이용한 고순도 루틸 TiO_2 나노 졸 제조
Preparation of High Purity Rutile TiO_2 Nano Sols from
Peroxo titanate acid solution

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The present paper describes a novel process for the highly pure TiO_2 sols with rutile crystalline phase in the average particle size about 50 nm. Our one-pot preparation method provides a direct route to control the size and crystalline phase of the nanocrystals within the sols. Rutile TiO_2 nanocrystals exhibit some unique dielectric, optical, and chemical properties that can be utilized in various applicative fields such as environmental catalysts, ceramic membranes, sensors, and optoelectronic devices. Lots of studies for preparing rutile TiO_2 sols have been performed so far by hydrothermal reactions in harsh acidic aqueous conditions containing inorganic or organic acids. However, they in general suffer from low purity because the contaminated ionic or organic impurities are not readily removed from the nanocrystals even carrying out repetitive purification processes. More badly, the mono-dispersed stable sols turn to be unstable due to agglomeration phenomena during the purification steps. The preparation methods for the nanoparticles with high purity are particularly important for optical or electronic applications. In this study, we report a novel process for preparing the highly pure rutile TiO_2 aqueous sols in the TTIP/ H_2O / H_2O_2 system. In the system, the possible byproducts are isopropyl alcohol, H_2O , and O_2 that can be readily removed. The characteristics of the sols focused on crystalline phase and size distributions as a function of experimental variables are investigated by optical micrograph, digital viscometer, TEM, DLS, XRD, ED-XRF, and FT-IR.