Silica-Coated Zinc Oxide Nanoparticles by Simple Solution Process: Growth and Properties

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As we know that ZnO nanoparticles having excellent UV-blocker capability particularly in UV-A region. The UV-absorption starts at 380 nm and crosses the rest of UV spectrum. Generally, ZnO has better UV-A protection than TiO2, because it absorbs strongly rather than scatters most UV-A, while TiO2 primarily scatters these wavelengths. With compare to TiO2, ZnO is also a well-known photocatalyst material. But photocatalytic activities restrict the application of ZnO as UV blocking materials. The high photocatalytic activity facilitates the generation of reactive oxygen species, which can oxidize and degrades other ingredients in the sunscreen formulations. The surface coating of ZnO nanoparticles is considered as an effective way to minimize such undesirable photoactivity. In this regard, first we have synthesized uniform ZnO nanoparticles via simple solution process, and then the surface of ZnO nanoparticles were coated with 2-3 nm thick silica material which was confirmed by TEM image. As the synthesis and coating of ZnO nanoparticles were demonstrated via simple, easy and fast simple solution process at low temperature, the process is applicable for large-scale synthesis production. Silica-coating over ZnO nanoparticles were further characterized by various analytical tools.