

SERS investigation of coatings on thermal modified titanium dioxide nanoparticles

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Titanium dioxide nanoparticles (TiO_2) are progressively manufactured and used in a wide variety of products such as sunscreens, papers, paints and toothpastes. The increase in the production and use of Titanium dioxide nanoparticles would escalate the risk for exposure of the natural environments to these compounds. There are several techniques for identifying and quantifying nanoparticles and Surface-Enhanced Raman Scattering (SERS) is an emerging technique which combines raman spectroscopy with nanotechnology. SERS can also be used to investigate the changes of natural coatings on nanoparticles as an important factor regarding their environmental fate and biological effects. In this work, TiO_2 P25 nanoparticles are thermally modified at different temperatures to study the effects of thermal shock on the crystal structure, surface properties and subsequently the Surface-Enhanced Raman Scattering from 4-Mercaptobenzoic acid molecules coated on TiO_2 nanoparticles has been observed. The results show that 4-Mercaptobenzoic acid molecules coated on nanoparticles exhibit different degree SERS enhancement on the surface of different nanoparticles modified at different temperatures by thermal modification method. This research work is expected to be important for improving SERS performance of TiO_2 nanoparticles for characterization of natural coatings.

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