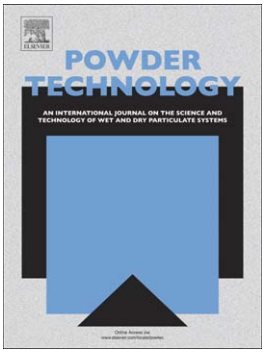

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Immobilization of photocatalytically active TiO_2 nanopowder by high shear granulation

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Abstract

Nano-TiO_2 powder is known to show high photocatalytic reactivity in the degradation of several organic pollutants. In this work, the powder was fixed on the surface of SiO_2 granules with the size of several micrometers using a high shear granulation process. Nanozirconia sol was applied as an inorganic binder. When the samples were tempered at 300 °C, they showed high stability in an aqueous solution for several hours. An energy dispersive x-ray spectroscopy (EDX) analysis confirmed that the cores and shells of the granules consisted solely of SiO_2 and TiO_2 respectively, and that ZrO_2 was found throughout the whole granules. Methylene blue (MB) was employed as a model system to evaluate the photocatalytic activity of the TiO_2 nanopowder and coated granules. It was shown that the TiO_2-coated granules lead to the degradation of MB under UV irradiation, whereas no effect was observed in the dark. After the degradation experiments the granules could be recovered and they remained active for further applications.