

Radiation Stability of Pigment ZnO Modified by Nanopowders

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Abstract : The effect of the modification of ZnO powders by ZrO₂, Al₂O₃, TiO₂, SiO₂, CeO₂ and Y₂O₃ nanoparticles with a concentration of 1-30 wt % is investigated by diffuse reflectance spectra within the wavelength range 200 to 2500 nm before and after 100 keV proton and electron irradiation. It has been established that the introduction of nanoparticles ZrO₂, Al₂O₃ enhances the optical stability of the pigments under proton irradiation, but reduces it under electron irradiation. Modifying with TiO₂, SiO₂, CeO₂, Y₂O₃ nanopowders leads to decrease radiation stability in both types of irradiation. Samples modified by 5 wt. % of ZrO₂ nanoparticles have the highest stability of optical properties after proton exposure. The degradation of optical properties under electron irradiation is not high for this concentration of nanoparticles. A decrease in the absorption of pigments modified with nanoparticles proton exposure is determined by a decrease in the intensity of bands located in the UV and visible regions. After electron exposure the absorption bands have in the whole spectrum range.

Keywords : irradiation, nanopowders, radiation stability, zinc oxide

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