Shift and broadening investigation of Raman active phonons of TiO$_2$ nanocrystallites at high temperatures

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(Received: 30/12/2008, in revised form: 21/6/2009)

Abstract: TiO$_2$ nanocrystallites in rutile phase with 68 nm dimensions have been synthesized by sol–gel technique. The structure and particle sizes have been determined by X-ray diffraction and SEM characterizations. Different factors in the rutile phase broadenings and shifts of the Raman modes at different temperatures, especially at high temperatures, have been studied. The effect of particle size, non-stochiometric effect, surface pressure and anharmonic phonon-phonon coupling have been considered and investigated.

Keywords: Raman spectroscopy, high temperature, nanocrystallite, SEM, TiO$_2$, rutile phase, phonon–phonon coupling.

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