

## Structural studies of titanium oxide after thermal treatment

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The present work describes the results of investigation of structure TiO<sub>2</sub> depending on temperature and thermal treatment conditions. The structural characteristics of the samples were evaluated using X-ray diffraction, SEM and Raman spectroscopy. Cylindrical-shaped TiO<sub>2</sub> ceramic specimens were prepared from plastic TiO<sub>2</sub> ceramic mass by extrusion. Plastic ceramic mass was obtained by mixing the required components (TiO<sub>2</sub> (anatase) powder, distilled H<sub>2</sub>O, binder and oil). Dried samples were sintered in air followed by thermal treatment in high vacuum conditions ( $2 \times 10^{-3}$  Pa). XRD patterns of all samples treated in vacuum, showed the presence of rutile crystalline structure. To compare morphology of the raw materials and obtained samples SEM was used. Raman spectra were measured using Renishaw inVia micro-Raman spectrometer equipped with argon laser (514.5 nm, max cw power  $P_{ex}=10$  mW). The spectral signal was dispersed by the 2400 grooves/mm grating onto Peltier-cooled (-60°C) CCD detector. Raman spectrum for anatase at room temperature consists of following allowed bands 144 cm<sup>-1</sup>, 197 cm<sup>-1</sup>, 399 cm<sup>-1</sup>(B<sub>1g</sub>), 513 cm<sup>-1</sup> (A<sub>1g</sub>), 519 cm<sup>-1</sup> (B<sub>1g</sub>), and 639 cm<sup>-1</sup>. The Raman spectrum of rutile, exhibited dominant peaks at 140, 235, 446, 610 and 820 cm<sup>-1</sup> after thermal treatment in air. But Raman spectra of rutile after vacuum thermal treatment have additional bands. The origin of these additional bands will be discussed.

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