

Spectroscopic study of water clusters in synthetic calcium hydroxyapatite

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Synthetic calcium hydroxyapatite $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ is very similar to the main mineral component of the hard tissues of living organisms. Thus, it is actively used in innovative medicine as a filler for artificial bones, for the manufacture of implants, in dentistry, etc. Mostly, such objects are in the aqueous environment, and small clusters of water have recently been discovered inside nanostructured calcium hydroxyapatite. Since the presence of water can significantly affect physical and chemical properties of minerals, information on the interaction of nanostructured calcium hydroxyapatite with water molecules can be useful from a practical point of view.

Three different samples of synthetic calcium hydroxyapatite were studied by means of vibrational spectroscopy. Raman and IR spectra of different samples were registered, as well as their SEM images. The conclusions about water content in each sample were made. Luminescence spectra of all three samples of calcium hydroxyapatite were studied under X-ray excitation at temperatures 295 K and 85 K. It was shown that at a low temperature (85 K), the luminescence spectra differed significantly from each other. This difference can be explained by their different structure and by different degrees of hydration of the samples.

Topics

Session A. Physics of condensed matter and spectroscopy

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