LUMINESCENT PROPERTIES OF POINT DEFECTS IN HYDROXYAPATITE NANOBELTS

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Hydroxyapatite [Ca\textsubscript{10}(PO\textsubscript{4})\textsubscript{6}(OH)\textsubscript{2}, HAp] is the principal biomineral component found in bone tissue like teeth and bones. For several decades, synthetic HAp with excellent biocompatibility, bioactivity, and osteoconductivity, has been obtained and used for a great variety of biomedical applications such as replacements for bone injuries, drug delivery agents and bioactive coating on metallic osseous implants and dental materials; also, it has been of great interest to use HAp to acquire contrast-enhanced images magnetic resonance, X-ray and near-infrared reflection imaging, when doped with rare-earth ions. In this work, HAp nanobelts were synthesized by a modified hydrothermal method and then characterized by different techniques to determine their structural, morphological and luminescent properties. The nanostructures composed by the HAp hexagonal crystal lattice, with calcium deficient HAp as the predominant phase, showed a high crystallinity and revealed a thin belt-type morphology with lengths 0.5 to 1 ?m and widths between 10 and 100 nm. EDS and XPS measurements demonstrated the calcium deficiency in HAp nanobelts, which resulted to be higher on their surface. Photoluminescence (PL) and cathodoluminescence (CL) results for these nanobelts in the visible range, reveal the presence of calcium and hydroxyl ions vacancies in the HAp lattice, while CL emission spectra in the near-infrared (NIR) range showed the presence of oxygen vacancies. A study of electron paramagnetic resonance (EPR) carried out on these HAp nanostructures, further confirmed the presence of oxygen vacancies.

\textbf{Keywords:} Hydroxyapatite, Nanobelts, Cathodoluminescence

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