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OSL study of ion-substituted hydroxyapatites

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Hydroxyapatite (HA, $Ca_{10}(PO_4)_6(OH)_2$) is a calcium orthophosphate which due to its similarity to mineral part of hard tissue is best known as biomaterial hard tissue regeneration [1]. However, HA has also been among the most studied dosimetric materials in the high dose and retrospective dosimetry, by the EPR (electron paramagnetic resonance) spectroscopy. As HA substituted with different ions is the one occurring in biological systems, ion-substituted HA are increasingly attracting attention as hard tissue biomaterials [2, 3]. But they could as well be used as OSL (optically stimulated luminescence) dosimeters [4].

To test this hypothesis, in this study influence of Mg and Si substitutions on the OSL response of irradiated HA was determined. Mg and Si substituted HA were synthetized by hydrothermal method. Obtained ion-substituted HAs were characterised by powder X-ray diffraction and scanning electron microscopy. EPR spectroscopy were used to follow and control the changes in relation with substituted ions and correlated with pure HA.

Obtained results indicate that Mg and Si ion substituted HA can be potential dose indicator material using OSL technique. However, more detailed study of the influence of the ion substitute concentration and type is needed to confirm their applicability as OSL dosimeters.

References

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