Advances in hydroxyapatite dosimetry: New trends

David John[1,2,3], Maksym Buryi[1,2], Kateřina Pachnerová Brabcová[3], and Ivo Světlík[3]

[1]*FZU - Institute of Physics of the Czech Academy of Sciences, Cukrovarnická 10, 16200 Praha 6, Czechia*
[2]*Faculty of Nuclear Sciences and Physical Engineering, Břehová 78/7, 11000 Praha 1, Czechia*
[3]*Nuclear Physics Institute of the Czech Academy of Sciences, Husinec - Řež, čp. 130, 25068 Řež, Czechia*

Hydroxyapatite is a major component of all organic solid tissues and has a wide range of applications. Biohydroxyapatite (bHAP) dosimetry is used to determine doses from artificial radiation exposure or archaeology to determine the age of remains. EPR dosimetry of dental enamel is considered the gold standard of retrospective dosimetry. Despite decades of research, it has not yet been possible to elucidate the origin, exact number or parameters of all signals in the complex EPR spectrum of bHAP. At room temperature, these signals overlap and saturate at low temperatures, so the applicability of the method has been limited to cases of large accumulated dose in bHAP. In this work we have attempted to examine the validity of this limitation using the advances and sensitivity of current and modern EPR measurement equipment.