

Dosimetry Based on EPR Spectral Analysis of Fingernail Clippings

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Ionizing radiation creates radicals in fingernails and toenails that are stable over a relatively long period (days to weeks) and characterized by an isotropic EPR signal at $g \sim 2.0$ (so called radiation induced signal or RIS). Unfortunately, radicals are also introduced by the mechanical harvesting of nail clippings and their EPR signals (so called mechanically induced signals or MIS) overlap the $g \sim 2.0$ region, interfering with efforts to quantify the RIS and therefore the radiation dose. We have investigated several different aspects of the physical, chemical and spectral properties of fingernail clippings to develop a protocol for their analysis by EPR spectroscopy. A major focus has been our efforts to understand the nature of the various species that contribute to the MIS for accurate spectral deconvolution to isolate and quantify the RIS.