

Investigating the use of EPR/alanine dosimeters for LET discrimination.

 2026.congresso.sif.it/talk/286

-
-
-

Hadrontherapy, by exploiting the finite range of particles, allows the use of high linear energy transfer (LET) radiation with better sparing of healthy tissues (compared to photons), so that LET measurements became essential in dosimetry. Therefore, this study aimed to investigate the use of alanine based on electron paramagnetic resonance (EPR) for LET discrimination. This is justified by the presence of 3 distinct radiation-induced radicals (R1, R2 and R3), whose concentrations are LET-dependent. The dosimeters were irradiated with photons and particles (protons and carbon ions) at the San Matteo Policlinico and CNAO centre, respectively (both in Pavia, Italy). The latter, in the spread-out Bragg peak (SOBP) condition, with pellets at different depths, covering LET values from 0.5 up to 100 keV/ μ m. EPR experimental spectra were acquired with an E580 Bruker spectrometer, while those simulated were obtained via EasySpin. Fitting results showed that low-LET and low-microwave-power conditions favour the presence of R1 and R2 radicals, while R3 becomes predominant at either high-LET conditions. Furthermore, microwave saturation analyses suggested that R3 is more saturation-resistant.