DOSE RECOSTRUCTION IN IRRADIATED FOOD CONTAINING HYDROXIAPATITE USING ESR SPECTROMETRY

D'Oca M.C. [(a)], Bartolotta A.[(a)], Brai M. [(b)], Marrale M.[(b)], Parlato A. [(c)]

[(a)]Dipartimento STEMBIO
[(b)]Dipartimento DIFI
[(c)]Dipartimento di Ingegneria Nucleare;
Università degli Studi di Palermo.

E-mail: mariacristina.doca@unipa.it

Among the physical methods that have been validated by the European Community as identification methods for irradiated food, the electron spin resonance (ESR) spectrometry is recommended as a simple and non-destructive technique for foods containing bone, since ionizing radiation induces free radicals in hydroxiapatite, a constituent of bone. The aim of this work was to use the ESR spectrometry also as a quantitative procedure to evaluate the original dose in irradiated turkey, pork and duck, using SAAD (Single Aliquote Additive Dose) technique . Bone samples were taken from unirradiated food collected from local market in Sicily; they were mechanical cleaned from bone marrow and then dried; little bone pieces, about 100 mg each, were used for experiments; different specimens were irradiated at "original" dose values of 1 and 3 kGy, and the ESR signal intensity was measured. Each specimen was then reirradiated with three consecutive added doses of 0.5 kGy each, and the ESR signal was measured afterwards. The mathematical relationship between the ESR signal intensity and the added dose was found; back extrapolation of the fitting function to the dose axis gives an estimation of the original dose in the sample. Our results show that the SAAD method gives an estimation of the original dose within ±20%.