

"Improvement of ESR/alanine dosimetry applied to radiotherapy dose level by ESR spectra simulation"

Beginning: mid-2009 or 2010

Duration: 12 à 24 months

Laboratory: Laboratoire National Henri Becquerel

Place: Commissariat à l'Énergie Atomique de Saclay – 91191 Gif-sur-Yvette

Contact : Tristan GARCIA – tel : +33 1 69 08 35 00 – tristan.garcia@cea.fr

Subject

The Laboratoire National Henri Becquerel (LNHB) is the French national metrology laboratory in the field of ionizing radiation. LNHB uses the electron spin resonance spectrometry (ESR) to assess alanine dosimeters. This non-destructive measurement method is applied over a widespread dose range (from a few to several thousands grays) with a low uncertainty. Applications of this technique are numerous and are associated with controlled irradiations.

The LNHB is willing to extend this method to radiotherapy dose level for control *in vivo* and for calibrations of irradiation beams. In particular, the LNHB wants to open the possibility to calibrate Tomotherapy[®] and Cyberknife[®] beams. This control needs uncertainties below 2 %.

The irradiated alanine ESR spectrum is complex; it is due to the creation of several radicals under ionizing radiation. These radicals are stable in solid phase. The radicals relative proportions must be determined using experimental methods like spin trapping or using simulation. This postdoctoral subject deals with this last point. The simulation should permit to deconvolute the spectrum to extract only the main single alanine radical (SAR). It is aimed at reducing the uncertainties while measuring the experimental spectra. Moreover, this subject should permit to understand and explain the variations of the shape of the spectrum while measuring it at different angles in the ESR cavity.

Experimental measurements will be considered to validate the simulations. The improvement of the spectra readings is one of the objectives of this subject.

This post-doc subject is mostly granted by the Laboratoire National de Métrologie et d'Essais (LNE).

Profile

The candidate should have a good knowledge and an experience in chemical and physics.

Theoretical awareness of ionizing dosimetry and fluent English are recommended.

The candidate will use one or several simulation software for those he must have past experience.