

Research field: Radiation-matter interactions / Solid state physics, chemistry and nanosciences
Metrology / Engineering science

Title: Study of the Fricke dosimeter in order to primarily characterise radiotherapy photon beams

Abstract: The Laboratoire National Henri Becquerel is the French national laboratory in the field of ionising radiation. Ionising radiations are used in cancer treatments. This application field has the most stringent needs in dose measurement accuracy. LNHB is thus developing its capabilities of measurement in order to provide solutions to face the quick growth of treatment technologies as well as the growing needs for safety and quality in patient treatments.

Among the goals of the LNHB, one is to establish absorbed dose to water standard for radiation fields comparable to those used in radiotherapy since water is a medium more representative of biological tissue, whether healthy or tumorous. The Fricke or ferrous sulphate in dilute sulphuric acid dosimeter is composed of at least 96 % of water. Ferrous ions are oxidised by the products of water radiolysis to ferric ions whose production is monitored through spectrophotometric measurements. Knowing the radiation chemical yield of ferric ions enables to measure the dose absorbed by the dosimeter.

The aim of this study consists at first in identifying and quantifying the main influence parameters on the dosimeter to be able to use it as a primary dosimeter. Afterwards, the dosimeter will be used to characterise a cobalt beam both in terms of absorbed dose to water and air kerma. Factors for correcting the perturbation of the radiation field by the dosimeter will be determined using Monte Carlo codes.

Location: Laboratoire National Henri Becquerel (LIST)

Laboratoire de Métrologie de la Dose

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