

Abstract

The clinical use of ionizing radiation to obtain a necrosing or cytotoxic radiobiological effect on tumoral lesions requires wide and complex physical and dosimetical procedures. In particular, it is necessary to calculate accurately the absorbed dose optimizing its delivery in order to treat the tumor, without affecting the surrounding healthy tissues. Moreover, the technological development of the last few years has led to an evolution in the field of radiotherapy, in the sense of an always bigger conformation of the dose distribution to the volumes to be irradiated, through the use of very complex dose release techniques. For this reason, priority target in radiotherapy is the research and the tuning of suitable systems for dosimetical measurements. In this context, the research activity presented in this PhD thesis has regarded not only the use and development of conventional dosimeters but mainly the development of new radiation detectors based on nanomaterials. Different nanomaterials have been prepared and tested under photon radiation, such as precursors of silver nanoparticles, manganese doped zinc sulphate nanoparticles, multiwall carbon nanotubes and graphene. This work demonstrates that these nanomaterials, interesting for their fascinating physical and chemical properties, are also very promising to realize dosimeters of new generation.