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Gamma irradiation for material testing

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Radiation resistance of materials is of great interest for various industries such as medical devices, nuclear power plants or aerospace. Among many types of radiation currently used for material testing, gamma is the most common because of its high availability in research or industrial irradiators, well standardized dosimetry, high reproducibility of the irradiation experiments. There are a couple of irradiation parameters not easy to achieve in any type of gamma irradiator. Dose rate is a parameter not commonly taken into account, but essential for testing certain materials such as coatings used in nuclear power facilities. Dose uniformity ratio is the other parameter required by certain standards, but often neglected in the published papers. IRASM Department of IFIN-HH acquired a long experience in setting up gamma irradiation for different materials. It operates two Co-60 gamma irradiators: a research, self-contained one (IAEA Category I – dry storage), and an industrial, versatile, panoramic irradiator (IAEA Category IV – wet storage) which can operate in both batch and continuous mode. In this paper, we present dosimetry data obtained from irradiation of samples in wide dose and dose rate ranges, as well as several experimental set-ups for irradiation of materials used in medicine, energy (nuclear power plants) and aerospace.

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