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Retrospective dose assessment by EPR and OSL in mobile phones

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In the retrospective dose assessment of individuals potentially exposed to ionizing radiation after an accident, dosimetry with inert materials can complement or be used as an alternative to biodosimetry assays.
In the framework of the EU funded project Multibiodose (www.MULTIBIODOSE.eu), it is proposed to implement a combined system of dose assessment based on the use of EPR and OSL measurement in mineral glass of the window displays and in electronic components from a same mobile phone. This work is being carried out with the objective to develop and validate a method for dose assessment in a mass-casualties scenario.
The first part of this work was dedicated to evaluate the properties of the EPR and OSL signals of types of glass and electronic components in mobile phones and to classify them according to three criteria: a) availability in portable electronic devices, b) presence of a radiation specific signal immediately after irradiation and c) presence of a remnant radiation induced signal 10 days after irradiation. Twenty-five mobile phones of different brands and models were analyzed at each partner laboratory, leading to a total of 75 devices covering 61 different models. All mobile phones contained electronic components presenting a radiation induced signal detectable by OSL and about 85% of mobile phones presented a detectable radiation induced EPR signal in glass. The detection limit of the OSL signal was lower than 1 Gy. The radiation sensitivity was found to be lower for the EPR/glass than for the OSL/components. For both glass and electronic components the signals were still clearly detectable 10 days after irradiation. In all electronic components a signal loss of about 50% after 10 days was observed, whereas in most glass samples the signal loss was not detectable or within the measurement uncertainty. The complementarities of EPR and OSL properties support our hypothesis about the advantages offered by using two independent measurement methods on the same device. A European intercomparison will be organized through the Eurados network (www.Eurados.org) in 2012 in laboratories owning OSL and EPR equipments, with the aim of spreading the expertise on these techniques in a laboratory network to develop large-scale capacity of measurement.

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