Masterproef industriële ingenieurswetenschappen

Accident dosimetry with mobile phone

Real-time measurements by means of mobile phone applications & Post-accident dose reconstructing with SIM cards

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Introduction

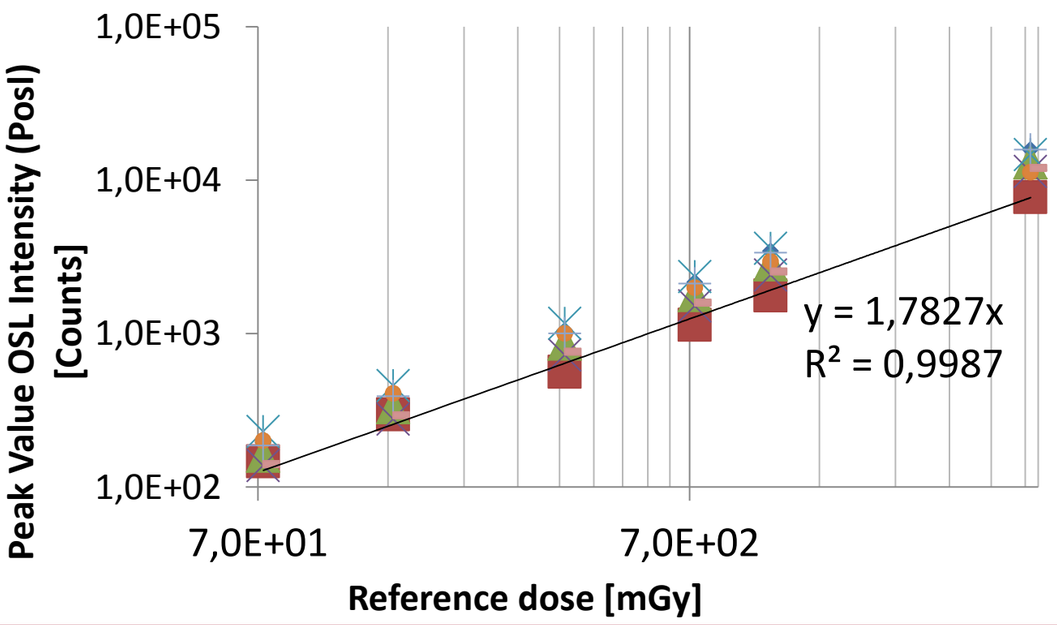
Using the mobile phone to detect ionising radiation

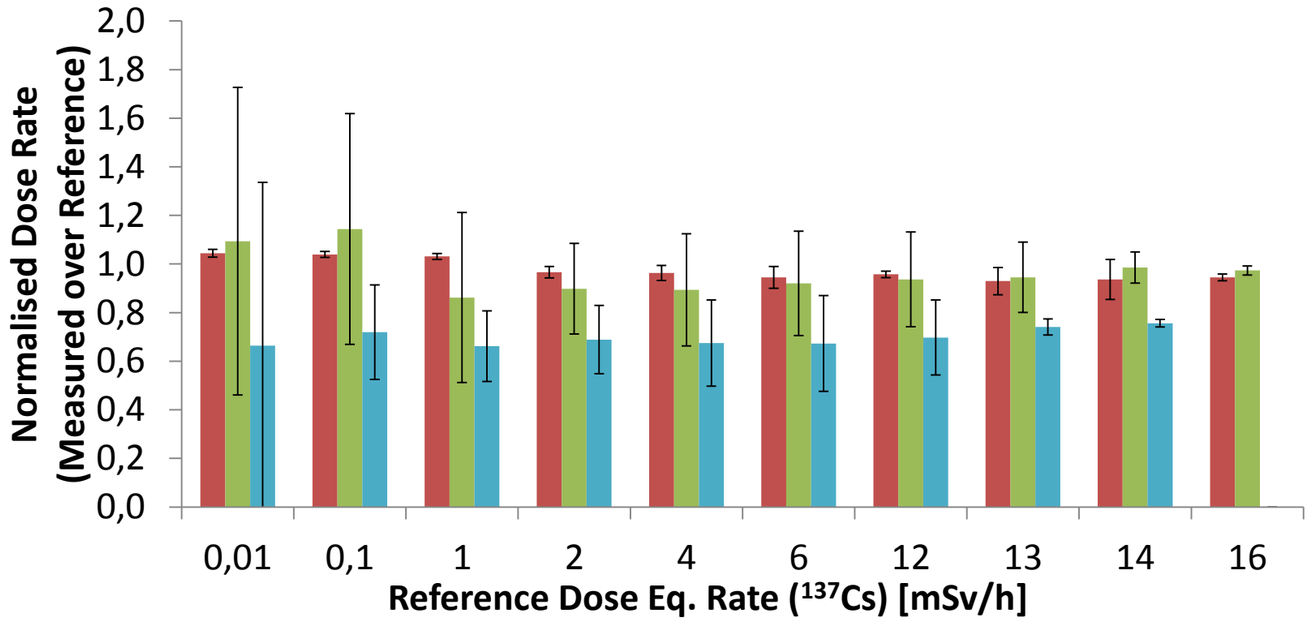
In this work we investigate the use of smartphone applications to evaluate dose rates in case of incidents/accidents with ionizing radiation and the use of SIM cards for retrospective assessment of doses received by the public.

Materials and methods

Several app's that uses the camera and an external GM-detector (PM1904 Polismart II) have been tested at the calibration laboratory of SCK•CEN with ^{60}Co and ^{137}Cs sources and additional tests were performed with X-rays. For the SIM cards, the silica filler of the epoxy encapsulant is analysed with Continuous Wave Optically Stimulated Luminescence (CW-OSL) using a TL/OSL Reader from Risø (Roskilde, Denmark) where the samples are stimulated at room temperature for 120s by blue LED's. Irradiations were performed with a $^{90}Sr/^{90}Y$ β-source.

Results





Left: *Dose response for different SIM cards* Right: *Dose response for polismart (red) and Radioactivity Counter app (Green & blue)*

Conclusion

- The iPhone apps are an interesting tool to inform the user of radiation levels, but are not very accurate
- The Polismart add-on application seems to be a more promising detector for making a preliminary & quick inspection at accident locations
- SIM cards can be used for dose assessments, however the signal fading will limit its precision

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