BOOK OF ABSTRACTS

INTERNATIONAL CONFERENCE ON RADIATION APPLICATIONS

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Comprehensive characterisation of Tyndall National Institute RADFETs for commercial applications in various fields

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Radiation Sensing Field Effect Transistors (RADFETs), also known as MOSFET dosimeters or pMOS dosimeters, have found applications in space, high-energy physics laboratories, and radiotherapy clinics. The RADFET is a discrete p-channel MOSFET with a thick gate oxide (typically from 100 nm to over 1 μm), optimised for radiation sensitivity. Radiation induces charges in the gate oxide, which cause the shift of the threshold voltage proportional to the radiation dose. The main good features of the RADFET are small size, simple/immediate/non-destructive read-out, electronic signal, and small cost when produced in volume. The main shortcoming is limited sensitivity, which precludes the use of standard RADFET designs in applications requiring minimum detectable dose lower than approx. 1 cGy.

Tyndall National Institute has been developing RADFETs for almost three decades. The technology has recently been transferred to a start-up company Varadis. We present results of electrical and radiation characterisation steps done on Varadis commercial RADFET products. We discuss critical issues in relation to the optimum use of RADFETs and possible methods for lowering the minimum detectable dose.