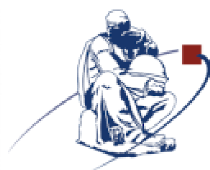

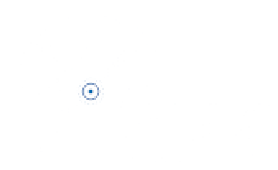

Contribution ID: **21** Type: **not specified**

Characterization of advanced detector and electronic devices performed at RBI

Thursday 19 November 2020 10:40 (20 minutes)

The PaRaDeSEC project "Particle and Radiation Detectors, Sensors and Electronics in Croatia"is an ERA Chair Horizon 2020 in the EU Framework Programme for Research and Innovation. A national center for development of radiation particle detectors, sensors and their associated electronics was successfully established as a result of the PaRaDeSEC project. The new Center for Detectors, Sensors & Electronics –CDSE is an independent RBI unit with a focal point of all activities related to the development, testing and construction of devices for the Nuclear, Particle and Astro-Particle, as well as Medical Physics Experiments and applications.

Advanced detector and electronic device testing activities are performed at the RBI's irradiation facility and the accelerator center (the largest experimental complex in Croatia).

The Radiation Chemistry and Dosimetry Laboratory at RBI has a high intensity gamma radiation source of Co-60 (2 PBq radioactivity) that is capable of delivering a large range of dose rates and can provide an excellent environment for radiation hardness studies. The facility is equipped with a specially designed and constructed setup with a temperature regulated environment accompanied by actively monitored dosimetric measurements. In this work we demonstrate that this setup is ideal for irradiation tests of both detector structures and integrated circuits.

The Ion Beam facility at RBI is equipped with a microprobe system that can deliver a variety of ions (from H to Au) into a 1 µm spot size at their respective energies (maximal energy between 8 MeV for protons and 25 MeV for heavy ions). The focused IBIC technique produces a spatially resolved Charge Collection Efficiency 2D map of different pad and pixelated detector structures. Moreover, the versatile capabilities of the microprobe at RBI is capable of evaluating the behaviour under ion irradiation of specific areas and elements inside sensors and electronic circuits. This makes it the ideal tool for SEE mapping on microscopic scale and finding the sensitive circuit elements responsible for the failure of the device. The facility is able to provide a Si and Cl ion beam with energy of 25 MeV that correspond to LET of 14.5 and 17.9 MeV-cm2/mg (respectively) inside Si substrate devices. The dependence of LET with depth was observed and presented in this work.

The techniques presented here are specially relevant for HVCMOS because they need CCE, TID and pinpoint accuracy SEE analysis due to their monolithic integration of detector and read out electronics in the same dye.

Primary author: Dr KARADZHINOVA-FERRER, Aneliya (Rudjer Boskovic Institute (HR))

Co-authors: Mr CRNJAC, Andreo (Rudjer Boskovic Institute (HR)); Mr DUNATOV, Toni (Rudjer Boskovic Institute (HR)); Dr FERENCEK, Dinko (Rudjer Boskovic Institute (HR)); Dr JAKSIC, Milko (Rudjer Boskovic Institute, Zagreb, Croatia); Dr MAJER, Marija (Rudjer Boskovic Institute (HR)); Dr MIHALJEVIC, Branka (Rudjer Boskovic Institute (HR)); PALOMO PINTO, Francisco Rogelio (Universidad de Sevilla (ES)); ROGULJIC, Matej (Rudjer Boskovic Institute (HR)); STARODUMOV, Andrey (Rudjer Boskovic Institute (HR))

Presenter: Dr KARADZHINOVA-FERRER, Aneliya (Rudjer Boskovic Institute (HR))

Session Classification: Transient Current Techniques (Thursday)