MULTIPURPOSE ELECTRON BEAM FACILITY IN SLOVAKIA FOR RESEARCH AND INDUSTRIAL APPLICATIONS

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Radiation processing had not been well-developed technology in Slovakia before 2011. It included one cyclotron for positron radioisotope production and two electron beam (EB) accelerators as parts of production lines for sterilization and tyre crosslinking, those in private companies of foreign ownership. Accelerator utilization for research purposes was minimal. Situation changed during last decade. Since 2011 more ion accelerators have been installed, 3MV Pelletron tandem accelerator for material research and dating at Comenius University in Bratislava, 6 MV tandem accelerator and 500 kV ion implanter of Slovak University of Technology for material research in Trnava as well as 2 MV tandem accelerator of Slovak Academy of Sciences in Piestany.

Research possibilities were widened also by a new electron accelerator in Trencin, designed for research and also industrial purposes. This multipurpose facility started its operation in 2012 with one main goal, to introduce the radiation treatment technology into practise in Slovakia. The facility runs one 5 MeV electron accelerator (LINAC) with 1 kW maximum power and with adjustable electron energy in the range 3.6 – 6.2 MeV. The electron beam can scan in various widths or to work in a pulse mode and together with variable velocity of conveyor, transporting the objects for irradiation beneath scanning beam, it offers wide range of irradiation dose rates (10 – 5600 kGy/h) for electrons. Moreover, the accelerator is equipped with tungsten target conversing electrons to X-rays, which spreads its fields of application and research possibilities. Due to low efficiency of conversion, the dose rates for X-ray treatment are in different but also wide range (26 – 1400 Gy/h).

During a decade since the multipurpose EB facility in Trencin has started its operation, wide range of research experiments was realized with many promising socioeconomic impacts. The research activities are in the field of radiation aging, medicine, environment and cultural heritage. The radiation aging includes research of radiation hardness of detectors of ionizing radiation, electronics for space applications and accelerator and nuclear power plant components [1, 2]. In medicine we collaborated on research of radiation treatment of hydrogels, skin, corneas and in the research aimed on radiotherapy of oncology patients [3]. Our research is aimed also to the serious environmental problematics in Slovakia, the contamination of soil and ground water by PCB (PolyChlorinated Biphenyls), were we use the accelerator to decontaminate environment [4, 5]. We collaborated with Serbian colleagues in research on radiation treatment of waste sludge from drinking-water-treatment plant [6]. Big impact might also have our successful story of preservation of a late-gothic wooden altar with help of radiation [7], which will open the gates for utilization the radiation technologies in the field of cultural heritage in Slovakia.

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