

Additional TORVIS Ion Source to the 6 MV Tandetron Ion Accelerator - Achieved Characteristics

Robert Riedlmajer^{1, a)}, Jozef Dobrovodský¹, Dušan Vaňa¹, Pavol Noga¹,
Martin Muška¹, Juraj Halanda¹ and Matúš Beňo¹

¹*Slovak University of Technology in Bratislava, Faculty of Materials Science and Technology in Trnava,
Advanced Technologies Research Institute, Jána Bottu 25, 91724 Trnava, Slovakia*

^{a)} Corresponding author: robert.riedlmajer@stuba.sk

Abstract. One of the significant activities of the Ion Beam Laboratory at the ATRI MTF STU located in Trnava is high energy ion implantation and modification of materials. The original installation of HVE 6 MV Tandetron™ tandem accelerator was equipped with SO358 Duoplasmatron ion source with a Na charge exchange cell for negative He beam generation and with the SO860C Cesium sputtering ion source for protons and other species negative beams. Recently the complete ion injector comprising of the NEC TORVIS (Toroidal Volume Ion Source) ion source, pre-acceleration, analyzing magnet, focusing and beam monitoring elements were added to Tandetron injector beamline. The TORVIS injector was originally installed and used with the NEC 5 MV Pelletron tandem accelerator in Harwell. The advantage of the TORVIS ion source is declared long-term stable and reliable operation, since with the typical maintenance interval 1000 hours. After re-installation, at least the same negative He⁻ and H⁻ beam currents were achieved as were operated during the previous installation. On the Faraday cup of the injector, these values were 5.6 μA for He⁻ and 35 μA for H⁻, respectively. Consequently, the beam currents after acceleration behind the high energy magnet were 2.1 μA for He⁺ and 9 μA for H⁺ beams. Long-term stable operation was confirmed during the testing operation. The TORVIS system must still be tuned to achieve the declared currents of 20 μA for He⁻ and 100 μA for H⁻ at the injector Faraday cup.