



Contribution ID: 328

Type: **Oral (Non-Student) / orale (non-étudiant)**

Dense Plasma Focus for Isotopes Activation

Tuesday 17 June 2014 14:30 (15 minutes)

Dense Plasma Focus for Isotopes Activation, C. Xiao, R.A. Behbahani, Sean Wolfe (Plasmionique Inc.), A. Hirose, University of Saskatchewan – A dense plasma focus (DPF) device (DPF-UofS) has been designed and is being fabricated and assembled at the University of Saskatchewan for production of short-lived radioisotopes utilizing the energetic ion beam emitted from DPF. Since the short-lived isotopes must be produced in proximity of treatment or diagnostic facilities such as PET (Positron Emission Tomography), DPF is a promising cost-effective and more portable alternative to cyclotron facilities. DPF-UofS will be formed by discharging a capacitor bank (30 kV, 4.5 μ F) through a pair of coaxial electrodes. The Lee Model has been used to optimize the design of DPF-UofS. A maximum ion beam fluence of about 10^{15} ions per shot, beam energy of 20 J has been predicted. For the $^{12}\text{C}(d,n)^{13}\text{N}$ reactions, the estimated radioactivity of ^{13}N (half lifetime is about 10 minutes) is about 1 kBq per shot. To achieve the desired radioactivity, high capacitor bank energy and high repetition rate is required.

The research is supported by CCNI, NSERC and CRC.

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Session Classification: (T2-8) Plasma Physics and Applications - DPP / Physique et applications des plasmas - DPP

Track Classification: Plasma Physics / Physique des plasmas (DPP)