MEASUREMENT OF ELECTRON SCATTERING CROSS SECTIONS OFMOLECULES USING MAGNETIZED ELECTRON BEAM

Haeuk Pyun [1], Dae Chul Kim [1], Young Rock Choi [1], Yonghyun Kim [1], Young-Woo Kim [1], Yeunsoo Park [1], Mi-Young Song [1], Jung-Sik Yoon [1], and Hyuck Cho [1]

[1]National Fusion Research Institute, Korea, Republic of

Electron-molecule interactions and their crosssections are very important in plasma research in understanding and modelingits behaviors. There have been many different efforts to measure these crosssections and the various measuring systems have been developed. Recently, based onthe idea from the Surko-type positron apparatus which is exploiting theadiabatic invariance of E_N/B[J. P. Sullivan et al, Phys. Rev.A 66, 042708 (2002)], a magnetized electron beam experiment was firstsuggested by the Australian National University group, and the experiment forstudying the electron-molecule scattering is being developed at NFRI. One ofthe benefits of using this techniques is that for someelectron-molecule interactions it is easier to measure cross sections. The experimental setup consists of electron gun, two retarding potentialanalyzers (RPA), a gas cell, and a Faraday cup. Electrons from e-gun becomepartially monochromatic beam by the first RPA, interact with target gases inthe gas cell. And the transmitted electrons will be energy-analyzed by the secondRPA and finally detected. Both gas celland the second RPA are under the magnetic fields of several hundred gauss. With this type of experimental apparatus, total cross sections (TCS) aremuch simpler to measure than the previous techniques. Sample TCSs and the future plans will be discussed.

This work wassupported by R&D Program of ‘Plasma Convergence & Fundamental Research’through the National Fusion Research Institute of Korea (NFRI) funded by theGovernment funds.