Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

On Accuracy of CES Microplasma and VUV Photoionization Spectra Determination ALEXANDER MUSTAFAEV, National Mineral Resources University (Mining University), St.-Petersburg, Russia, BORIS DOBROLEZH, State University of Maritime and Inland Shipping, St.-Petersburg, Russia, ALEXANDER TSYGANOV, VERA YAKOVLEVA, St.-Petersburg State University, Russia — Energy spectra of electrons released via ionization of admixture in the bulk gas, not using traditional evacuated energy analyzers, can be determined by Collisional Electron Spectroscopy (CES) [1]. This approach may result in miniature gas sensors for medicine, safety equipment, combustion engine control, etc. Said admixtures are ionized by metastable atoms or by vacuum ultraviolet photons, having definite energy, from micro-plasma sources. Electrons energy provides ionization potential and identification of the species. According to CES, electrons may suffer a number of scatterings inside of the bulk gas, but their diffusion path is confined by appropriate sensor's configuration. Using simple plane geometry of CES sensors, we can get EEDF by Druyvesteyn's expression and 2-nd derivative of current-voltage signal at a high (up to atmospheric) gas pressure. Also 2-nd derivative may be, e.g., obtained by ω modulation and 2ω detection technique, we used smoothing-differentiating procedure with spline least-squares approximation of current-voltage curve as a more suitable for execution rate critical applications. Modeling noise influence on accuracy and resolution of the method will be reported.

[1] A.A.Kudryavtsev, A.B.Tsyganov. US Patent 7,309,992

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Date submitted: 12 Jul 2013 Electronic form version 1.4