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XUV Spectroscopic Diagnostics for Microplasma Research DAN STUTMAN, MICHAEL FINKENTHAL, Johns Hopkins University — Microplasmas are high density, dc or pulsed discharges produced in cavities having 10-100 μm typical size. Although spectroscopy is the best tool for their characterization, important plasma parameters such as electron density, temperature, energetic electron fraction and impurity content are difficult to measure using visible light emission. Since the bulk microplasma emission is expected to be in the XUV ($\approx$ 100-1500 Å), we study the possibility of adapting XUV diagnostics developed for magnetically confined plasmas, for use in microplasma research. For instance, a tool that could enable, with appropriate modeling, the characterization of the EEDF in dc microplasmas would be a transmission grating XUV 'radiometer' that measures the spectral distribution of the emitted power. Also a device based on 'multi-energy' filtered photodiodes, similar to that we developed for fast temperature diagnostic in tokamaks, could be used for EEDF characterization in pulsed microplasmas. In addition, the proposed diagnostics will enable new research directions, such as the study of turbulent fluctuations. To benchmark the XUV emission models for microplasma application, we propose to use a scaled-up macroscopic hollow cathode discharge, in which conventional diagnostics can be used for reference measurements of the bulk density, temperature and non-thermal component.

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