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Low temperature tungsten spectroscopy on a Penning Ionization Discharge[1] DEEPAK KUMAR, ALEXANDER ENGLESBE, DAN STUTMAN, MICHAEL FINKENTHAL, Johns Hopkins University — Complete Tungsten divertor operation is being planned on many tokamaks including Tore Supra and ITER. Thus, low temperature tungsten spectroscopy is important for aiding the divertor diagnostics on larger machines. A Penning Ionization Discharge (PID) at the Johns Hopkins University produces steady state plasmas with $T_e \sim 2$ eV, $n_e \sim 10^{13}$ cm^{-3} and a fast electron fraction at $\sim$ 10s eV. Similar bi-Maxwellian distributions, but with slightly higher electron temperatures, are found in the divertor plasmas of tokamaks. The two significant populating mechanisms for higher charge states in the PID are: (a) collisional excitation from bulk electrons, and (b) inner shell ionization from the fast electrons. The PID is diagnosed in a wide wavelength range - XUV, VUV and visible, to differentiate the two populating mechanisms. W is introduced in the PID by the sputtering of cathodes made of CuW alloy. Spectral emission from significantly higher charge states of W (up to W IV) has been observed in the experiment. This poster will describe results indicating the populating mechanism of W ions and also describe plans on upgrading the experiment to achieve higher temperatures which are closer to the divertor conditions.

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