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Soft X-ray Spectra of Highly Charged Hf, Ta, W, and Au[1]
JOSEPH READER, JOHN GILLASPY, ILIJA DRAGANIC, YURI RALCHENKO, JOSEPH TAN, JOSHUA POMEROY, SAMUEL BREWER, NIST — We use our EBIT to measure wavelengths for highly-charged states of heavy elements for use in diagnostics of fusion-type plasmas, such as ITER. The range of our grazing-incidence spectrometer has been extended to below 2 nm to obtain overlap with our microcalorimeter. Our range of electron impact energies now spans 2-24 keV. We use atomic data generated by the FAC code and collisional-radiative modeling with the NOMAD code to interpret the observed spectra. Previously [1], we published wavelengths for Na-like, Mg-like, and Al-like ions of Hf(Z=72), Ta(Z=73), W(Z=74), and Au(Z=79) from 6.5 to 8.5 nm. We now measure wavelengths for these ions in the region 1.8 to 2.6 nm. Our preliminary values for the $3s_{1/2}$-$3p_{3/2}$ transition in the Na-like ions are 2.5772(18) nm for Hf^{61+}, 2.4498(18) nm for Ta^{62+}, 2.3245(18) nm for W^{63+}, and 1.8059(22) nm for Au^{68+}. For these ions, the fine structure splitting of the D-line doublet is larger than the mean value of the transition energy. We observe this giant splitting directly in a single spectrum on our grazing-incidence spectrometer. [1]Yu. Ralchenko et al., J. Phys. B: At. Mol. Opt. Phys. **41**, 021003 (2008).

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