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Production of H, D, and He Plasmas in the ORNL High Flux Helicon Plasma Source[1] R.H. GOULDING, T.M. BIEWER, J.B.O. CAUGHMAN, G.C. CHEN, L.W. OWEN, D.O. SPARKS, Oak Ridge National Laboratory — The ORNL high particle flux helicon source is has been operated with various light ions at power levels up to 30 kW. It is being studied as an electrodeless source for a linear plasma materials interaction (PMI) test facility that will generate particle fluxes $\Gamma_p > 10^{23} m^{-3} s^{-1}$, and utilize additional ion and electron cyclotron heating to produce high heat fluxes $\sim 10 MW/m^2$. The maximum magnetic field strength $|B|$ in the plasma production region for which high density operation is possible at the present power level has been found to increase with increasing ion mass. Operation with $|B| \sim 0.5T$ has been achieved with He as the working gas. The radial density profile is found to be strongly dependent on the axial magnetic field geometry, and both strongly centrally peaked and flat profiles have been obtained. Maximum plasma densities $> 4 \times 10^{19} m^{-3}$ have been achieved with He, and $> 2.5 \times 10^{19} m^{-3}$ with H. The device has been modeled using the EMS2D (G. Chen et al., Phys Plasmas 13 (2006) 123507) and SOLPS (R. Schneider, X. Bonnin et al., Contrib. Plasma Phys. 46 (2006) 3) codes. The latest results will be presented.

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