Abstract Submitted
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Atomic data for low temperature mid-Z elements for lithography applications[1] AMANDA NEUKIRCH, DAVID KILCREASE, PETER HAKEL, CHRISTOPHER FONTES, MANOLO SHERRILL, JAMES COLGAN, Los Alamos National Laboratory — Strong emission from plasmas of mid-Z elements, such as tin and xenon, in the 11-14 nm wavelength has long been acknowledged as a powerful source of EUV light with significant applications for lithography. We have performed investigations into the complex atomic structure of relevant ion states (from 5 times ionized to 20 times ionized) to model the low temperature (<50 eV) opacity in Xe. It is known that full configuration-interaction (CI) is required to properly describe the strong mixing between the various n=4 subshells that give rise to Δn=0 transitions. We find that this technique results in transition energies within 1% of experimental values. Detailed comparisons will be presented. In opacity calculations, large numbers of configurations are necessary to ensure a converged partition function. Full CI calculations for many configurations quickly becomes computationally prohibitive. Instead, we use a model developed for Sn where full CI is utilized for the most important transitions, while intermediate-coupling is used for all other levels. We present opacities generated at temperatures and densities related to lithography applications. Our preliminary results indicate that our models are in good agreement with transmission measurements from laser-produced Sn and Xe plasmas.

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