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Opacity calculations for low temperature Xe for lithography applications 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 employ the Los Alamos suite of atomic physics codes and plasma kinetics modeling code ATOMIC to compute the LTE emissivity of Xe in plasma regimes of interest to EUV lithography applications. In opacity calculations, large numbers of configurations are necessary to ensure a converged partition function. Full configuration interaction (CI) calculations for many configurations quickly becomes computationally prohibitive. Instead, we use a model where full CI is utilized for the most important transitions, while intermediate-coupling is used for all other levels. 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. 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 Xe plasmas.

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