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Ionization competition effects on population distribution and radiative opacity of mixture plasmas. JIAOLONG ZENG, CHENG GAO, JIANMIN YUAN, National University of Defense Technology — The physical effects on the charge state distribution and radiative properties of mixture plasmas are investigated using a detailed-level-accounting approximation. Detailed results are given for SiO2 plasmas. Ionization competition arising from the electronic shell structures of various atomic species in the mixture plasmas was investigated to show its effects on the charge state population distribution and spectrally resolved and Planck and Rosseland mean radiative opacities of mixture plasmas. A set of coupled equations for ionization equilibria that include all components of the mixture plasmas are solved to determine the population distributions. For a given plasma density, competition effects are found at three distinct temperature ranges, corresponding to the ionization of M-, L-, and K-shell electrons of Si. Taking the effects into account, the spectrally resolved and Planck and Rosseland mean opacities are systematically investigated over a wide range of plasma densities and temperatures. For a given mass density, the Rosseland mean decreases monotonically with plasma temperature, whereas Planck mean does not. Although the overall trend is a decrease, the Planck mean increases over a finite intermediate temperature regime.

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