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A comparison of the relative sensitivities of Au and Zn ionization in buried layer targets

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An experiment has been done at the National Ignition Facility (NIF) using a buried layer platform to study the radiative properties of non-local thermodynamic equilibrium (NLTE) gold plasma at an electron temperature of $\sim$3 keV and an electron density of $\sim 10^{21} \mathrm{cm}^{-3}$. The targets used consisted of a 625 µm diameter, 1900 Å thick dot with two different mixtures of Au and Zn: one at 1:2.25 atomic mix of Au and Zn and the other 1:4.5. The dot was placed in the center of a 2500 µm diameter, 10 µm thick beryllium tamper. Lasers heat the target from both sides for 4.0 ns. The size of the emitting volume vs time was measured side-on with time resolved x-ray imaging to infer the ion density versus time. The radiant x-ray power was measured with a low-resolution, absolutely calibrated x-ray spectrometer (DANTE). The Au L-shell and the Zn K-shell were measured simultaneously and time resolved with the same spectrometer and streak camera. The electron temperature was inferred from the measured zinc K-shell emission. A comparison is made of the relative sensitivities to the plasma conditions of the Au and Zn ionization which were inferred from the time resolved L- and K-shell emissions respectively.

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