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Observation of ionization shifts in K-shell emission from short-pulse laser irradiated micro-dot targets PAUL NEUMAYER, ANDREA KRITCHER, OTTO LANDEN, HAEJA LEE, DUSTIN OFFERMAN, ERIC SHIPTON, SIEGFRIED GLENZER, Lawrence Livermore National Laboratory — X-ray Thomson scattering using short pulse laser generated intense line radiation has a great potential as a time-resolved temperature and density diagnostic for high-energy density states of matter. We present recent results characterizing Chlorine K-alpha and K-beta line emission obtained by irradiating Saran foil with 50 Terawatt laser pulses from the Callisto laser (Jupiter Laser Facility, Lawrence Livermore National Laboratory). Spectra from front and rear side emission are recorded simultaneously with high resolution HOPG spectrometers employing imaging plate detectors. Conversion efficiencies of laser pulse energy into x-ray line emission of several 10^{-5} are achieved and are maintained throughout up to 7 J of laser energy, thus constituting a short pulsed narrow band x-ray source of more than 10^{11} photons. When the target size is reduced to 50 micrometer ("micro-dot") a significant blue-shift of up to 5 eV is clearly observed. This can be attributed to higher ionization states of the target atoms indicating achievement of a high-temperature solid density state. This work was performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under Contract No. W-7405-ENG-48 and LDRD 05-ERI-003.

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