

Spectroscopic Studies of Soft X-Ray Emission from Gadolinium Plasmas

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Abstrak

The temporal behavior of gadolinium (Gd) laser-produced plasmas has been studied using a modified grazing incidence spectrometer which allows to capture the evolution of the plasma with spectral and temporal resolution of 0.1 nm and 1 ns, respectively. Experimental results indicate that the soft X-ray emission follows the temporal behavior of the laser pulse at high laser power density of 4.4×10^{12} W/cm² in which the soft X-ray emission lasts for 7.5 ns (at FWHM) whereas at 5.4×10^{11} W/cm² and 7.6×10^{10} W/cm² the emission lasts for only 4 ns and 2.5 ns respectively, these are shorter than laser pulse duration due to lower electron temperatures achieved in the plasma generation. Lower Gd ion stages ranging from Gd¹¹⁺ – Gd¹⁴⁺ are also found to contribute to the spectral emission over time.