Spectroscopic Investigations of Laser Produced Plasma

Divya D Pai,[1] Pramod Gopinath[1,*]

[1]*The International School of Photonics, Cochin University of Science and Technology, Cochin-682022, India*

**Corresponding author:pramod@cusat.ac.in*

Abstract

The optical emission spectroscopy (OES) of Laser Produced Plasma (LPP) is called Laser Induced Break-Down Spectroscopy (LIBS). The important parameters that govern the properties of a LPP are electron temperature (T_e) and electron density (n_e). Here, we report on the experimental setup for generating laser produced brass plasma, OES of plasma, transition line identification and estimation of T_e and n_e using Boltzmann plot method and Stark broadening method respectively.

In this study, plasma was generated by focusing beam from a Nd:YAG ns-laser operating near 10 Hz, with 20 mJ energy in pulses of 10 ns duration over disc shaped brass target kept inside a plasma chamber which was maintained at low pressure of 0.007 mbar. For recording optical emission spectra of brass plasma, the emissions are viewed orthogonal to the plume propagation direction and imaged onto the input slit of a CCD spectrometer using 1:1 imaging optics. The recorded emission spectra of brass plasma mainly consisted of neutral and singly ionized copper and zinc. The slope of Boltzmann plot obtained using persistent lines of copper provided the plasma temperature as 0.74 eV (8588 ^{o}K) at a distance 3mm from the target, whereas, plasma electron density is estimated as 3.813×10^{15} cm^{-3} using Stark broadened line profile of Zn I spectral line centered at 481.05 nm.

Acknowledgements: This work was supported by DST-INSPIRE Fellowship [IF170324].