Abstract

The influence of external magnetic field on Titanium (Ti) plasma is explored by employing laser induced breakdown spectroscopy technique. Q-switched Nd: YAG laser (1064 nm, 10ns) was used to expose Ti targets under environments of Ar & Ne at pressures varies from 5 torr to 760 torr and at laser irradiance varying from 20 GW/cm^2 to 35 GW/cm^2. The emission spectra is recorded in existence of magnetic field of 0.5 Tesla and in field free case. Four emission lines of Ti (1) plasma (316.009 nm, 406.04 nm, 519.34 nm, and 672.94 nm) were selected for evaluation of plasma parameters. Both plasma parameters initially increase with increasing laser irradiance and pressure attain a maximum value at irradiance 30 (GW/cm^2) and 30 torr pressure. Then decrease gradually or show saturation at all higher pressures and irradiances. The increasing trend is attributed to more energy deposition, and spacial confinement effects offered by environmental gases. The decreasing trend or saturation is attributed to self-regulating regimes or shielding effects at higher irradiances and pressures. It is also observed that plasma parameters are higher due to magnetic confinement in case of magnetic field employment under all pressures and at all irradiances. The analytically calculated values of thermal β_t , $\boldsymbol{\beta}_{t=\frac{(\text{particle pressure})}{(\text{magnetic pressure})}}$ is smaller than 1 and assure the existence of magnetic field under all parameters.