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# Characterization of laser induced plasma: Analysis of rocks using calibration free LIBS

The laser induced plasma of rock samples has been characterized by determining plasma parameters such as plasma temperature and electron number density. The plasma has been produced by irradiating focused laser pulses of the fundamental wavelength 1064 nm of an Nd: YAG laser. The plasma emissions have been collected and analyzed using LIBS2500 + spectrometer. The emission spectra have been used to determine the plasma temperature using iron emission lines in Saha Boltzmann plot, whereas, the electron number density has been estimated using Stark broadened emission line of hydrogen (Hα) laying at 656.30 nm.
To characterize the laser induced plasma, the plasma has been produced as a function of laser energy from 80-150 mJ per pulse and in the presence of magnetic field of 1 to 3.5 kG strength. The plasma electron temperature and the number density of electrons being determined were used to verify the condition of local thermodynamic equilibrium (LTE). The normalized emission spectra and calibration-free laser induced breakdown spectroscopy technique were employed to measure the concentration of rock constituents. The compositional analysis was performed using the calibration free technique which shows that Li, B, Na, Mg, Si, K, Ca, Fe, Cu, and Zn are present in almost all the rock samples, but their concentration varies from sample to sample.

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