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Analysis of RF emissions from laser induced breakdown of atmospheric air and metals PREM KIRAN PATURI, VINOTH KUMAR LAKSHMI, MANIKANTA ELLE, LEELA CHELIKANI, ACRHEM, University of Hyderabad, Prof. C.R. Rao Road, Gachibowli — The low frequency (RF, microwave) emissions from laser produced plasma (LPP) are of great interest because of their variety of applications. The RF waves emitted by the nanosecond LPP of atmospheric air and metal (Al, Cu) targets were detected using antennas over frequency ranges (30MHz-18GHz) and were monitored using a spectrum analyzer (3Hz-50GHz). With different target materials, the dominant emission lines were observed to fall in different specific frequency ranges within the detection limit. The emissions from Cu were in the higher frequency range (100-200 MHz) than that of Al (30-100 MHz) may be due to the higher electron density of Cu, which contributes to the LPP conductivity. From the LPP of atmospheric air, the RF output was found to be increasing with the input laser energy up to certain value, beyond which almost no emission was observed. This effect is attributed to the modification in the net induced dipole moment due to the multiple plasma sources in the LPP at higher input laser energies. The detected radiation was observed to be dependent on laser and antenna polarization. Further studies may lead to an efficient technique for material identification from the RF characteristic peaks.

Prem Kiran Paturi
ACRHEM, University of Hyderabad, Prof. C.R. Rao Road, Gachibowli

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