Abstract
Tremendous utilization of plastics with inappropriate disposal is hazardous to the climate and the ecosystem. Microplastics (MPs) having dimensions less than 5mm are being considered as the main cause of sea pollution. These microplastics (MPs) due to hard, thin and non-degradable nature,cause adverse effects on the marine biota and consequently on the human beings due to the intakeof sea food. Therefore the identification of these microplastics is highly important for the environmental studies. Laser Induced Breakdown Spectroscopy (LIBS) is a simple and reliable technique for identification and analysis of these MPs. By focusing Nd:YAG laser (1064nm,10ns, 55mJ) at irradiance of 8.2 GW/cm2 on the microplastic surface, plasma is generated. The emission intensities enhancement is accomplished by performing the entire experiment under 50 torr pressure of Argon. For improving the reliability of quantitative elemental investigation through LIBS, the Calibration Free LIBS (CF-LIBS) technique is utilized along with Boltzmann, Saha-Boltzmann, and Stark broadening profiles. Allyl diglycol carbonate or poly allyl diglycol (CR-39) is taken as a reference to confirm the validity and accuracy of CF-LIBS method. The six unknown microplastics are collected from coastal area and shallow waters of Arabian sea Karachi, Pakistan. They are analyzed by CF-LIBS method and the concentration varies from 27.60 % to 83.00 % for carbon (C ) and from 16.50 % to 30.25 % for oxygen (O). The objective of present work is quick and fast identification of microplastics by laser-induced plasma spectroscopy (LIPS). Fourier Transformation Infrared (FTIR) spectroscopy technique is additionally being utilized for the analysis of MPs. The acquired set of results endorse the predictive investigation ability of LIBS method for microplastic identification which is an innovative aspect of present work.