Film Analysis Employing Subtarget Effect Using 355 nm Nd-YAG Laser-Induced Plasma at Low Pressure

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Abstract

The applicability of spectrochemical analysis for liquid and powder samples of minute amount in the form of thin film was investigated using ultraviolet Nd-YAG laser (355 nm) and low-pressure ambient air. A variety of organic samples such as commercial black ink usually used for stamp pad, ginseng extract, human blood, liquid milk and ginseng powder was prepared as film deposited on the surface of an appropriate hard substrate such as copper plate or glass slide. It was demonstrated that in all cases studied, good quality spectra were obtained with very low background and free from undesirable contamination by the substrate elements, featuring ppm or even sub-ppm sensitivity and worthy of application for quantitative analysis of organic samples. The proper preparation of the films was found to be crucial in achieving the high quality spectra. It was further shown that much inferior results were obtained when the atmospheric-pressure (101 kPa) operating condition of laser-induced breakdown spectroscopy or the fundamental wavelength of the Nd-YAG laser was employed due to the excessive or improper laser ablation process.