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Analytical application of femtosecond laser-induced breakdown spectroscopy[1] NOUREDDINE MELIKECHI, YURI MARKUSHIN, Delaware State University — We report on significant advantages provided by femtosecond laser-induced breakdown spectroscopy (LIBS) for analytical applications in fields as diverse as protein characterization and material science. We compare the results of a femto- and nanosecond-laser-induced breakdown spectroscopy analysis of dual-elemental pellets in terms of the shot-to-shot variations of the neutral/ionic emission line intensities. This study is complemented by a numerical model based on two-dimensional random close packing of disks in an enclosed geometry. In addition, we show that LIBS can be used to obtain quantitative identification of the hydrogen composition of bio-macromolecules in a heavy water solution. Finally, we show that simultaneous multi-elemental particle assay analysis combined with LIBS can significantly improve macromolecule detectability up to near single molecule per particle efficiency.

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