

LIBS Microprobe for Mapping Elemental Distributions in Cells

Disclosure Number

200201110

Technology Summary

The subject invention disclosed herein is an analytical method using laser-induced breakdown spectroscopy (LIBS) for macroscopic elemental analysis applied on a micro-scale for in-situ elemental analysis and spatial mapping in cells. The method of the subject invention focuses a high-power laser beam onto a sample surface for optical excitation of its constituents. Typical laser spot sizes for focused laser beams are comparable to or greater than cellular outer dimensions (tens of micrometers), but use of precision focusing optics can reduce the spot size to subcellular dimensions. Use of the subject invention allows elemental distributions within the nucleus and the cytoplasm to be compared, elemental distribution across the cell mapped, and cell-to-cell variations determined. The method of the subject invention addresses the uptake and distribution of pharmaceutical compounds within cells. In addition, the subject invention provides a range of opportunities for biochemical analysis where non-equilibrium or varying elemental concentrations are significant, or for other pharmaceuticals whose cellular uptake requires evaluation, especially on a cellular level. This intracellular analytical capability provides a major improvement over existing tedious, time-consuming, and costly analyses of elemental distributions between the nucleus and the non-nuclear cell material.

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