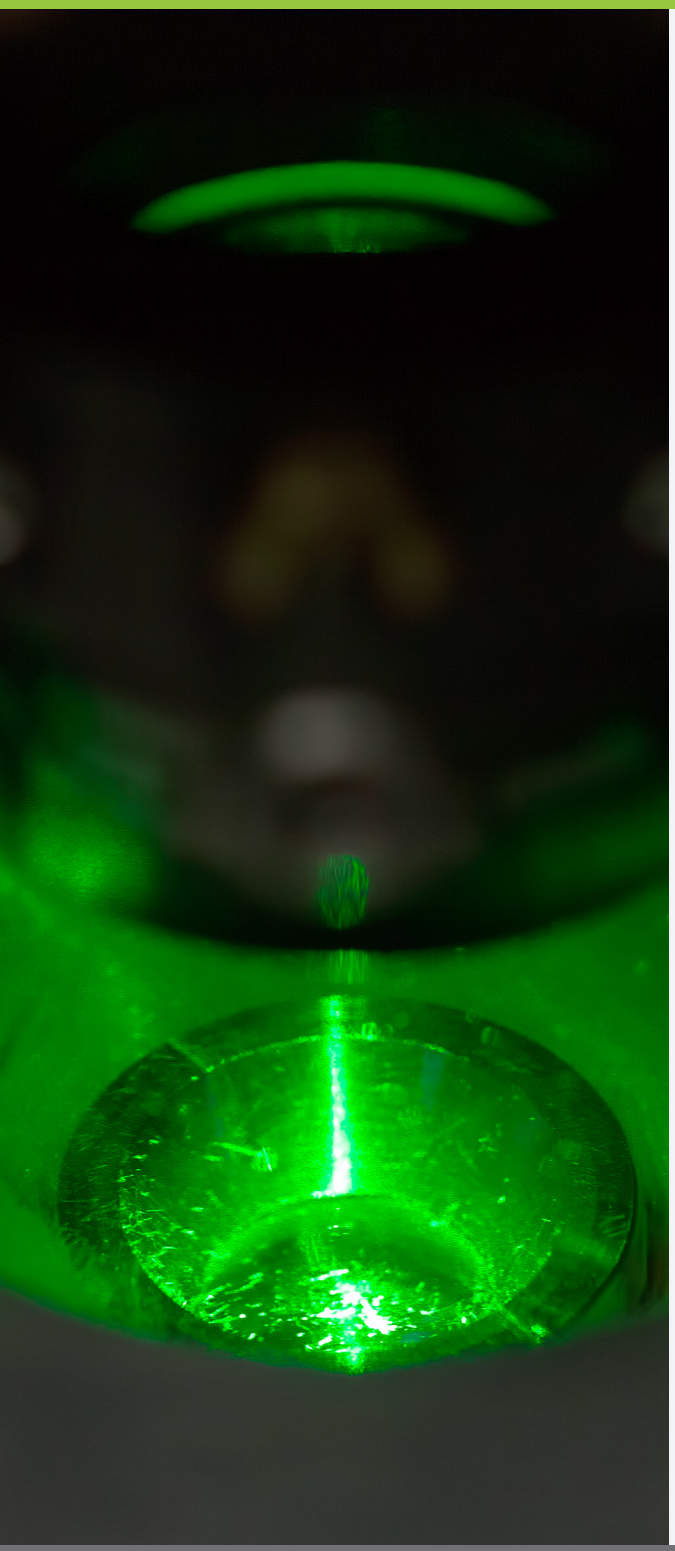
Available for Licensing

NATIONAL ENERGY TECHNOLOGY LABORATORY

LASER INDUCED BREAKDOWN SPECTROSCOPY PROBE FOR SIMPLIFIED LIGHT COLLECTION AND LASER OPERATION



OPPORTUNITY:

The U.S. Department of Energy's National Energy Technology Laboratory (NETL) has developed a laser induced breakdown spectroscopy (LIBS) probe featuring simplified construction that minimizes the need for optical elements from the probes data collection path, reducing potential interference with the transmission of high quality spectra. By reducing the complexity and cost of the laser head, the invention maximizes the amount and quality of light returned for analysis and increases the usefulness of LIBS research. This invention is available for licensing and/or further collaborative research from NETL.

OVERVIEW:

LIBS is recognized as a powerful tool for qualitative elemental, molecular, and isotopic analysis of materials. LIBS uses short, powerful pulses to initiate dielectric breakdowns in solids, liquids, and gases and produces a bright flash of light at wavelengths that are characteristic of the elements present in the target. When this light is analyzed by a spectrometer, the identities of the elements present can be estimated and sometimes quantified. The light generated by the LIBS pulse must be returned through a fiber optic cable to a spectrometer. That requires a set of at least four mirrors, two of which need to be dichroic mirrors produced through an extensive chemical vapor deposition process.

This invention avoids the need for two mirrors, reducing the complexity and cost of the laser head and maximizing the amount and quality of light returned for analysis.

SIGNIFICANCE:

- Simplifies the laser construction reducing costs
- Removes elements from the optical collection path that may have interfered with the transmission of the highest quality spectra for analysis
- Minimizes optical components and optical losses for the analysis light
- Requires minimal amount of fabrication and alignment

Principal Investigator:
Dustin McIntyre

APPLICATIONS:

The invention can be used in laser induced breakdown spectroscopy activities for improved analysis of advanced materials and in chemistry analysis. It also provides a more effective tool for analysis activities in geological and environmental sciences, materials science, and medicine. The approach can also be useful as an optical sensor for environmental water and air research or in laser range finding. This invention could also be part of an integrated laser ignition system that provides data feedback about combustion processes. The probe could also be used in confined or difficult to reach locations to provide data about solids, liquids, or gases in the area.

RELATED PATENTS:

U.S. Patent No: 10,145,737

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Title: Laser Induced Breakdown Spectroscopy (LIBS) Probe for Simplified Light Collection and Laser Operation

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