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## Laser Induced Breakdown Spectroscopy (LIBS): Application to Geological Materials\*

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Laser-induced breakdown spectroscopy (LIBS) is emerging as an analytical tool for investigating geological materials. The unique abilities of this technique proven its potential in the area of geology. Detection of light elements, portability for in-field analysis, spot detection, and no sample preparation are some features that make this technique appropriate for the study of geological materials. The application of the LIBS technique has been tremendously developed in recent years. In this report, results obtained from previous and most recent studies regarding the investigation of geological materials LIBS technique are reviewed. Firstly, we introduce investigations that report the advancement in LIBS instrumentation, its applications, especially in the area of gemology and the extraterrestrial/planetary exploration have been reviewed. Investigation of gemstones by LIBS technique is not widely reviewed in the past as compared to LIBS application in planetary exploration or other geological applications. It is anticipated that for the classification of gemstones samples, huge data set is appropriate and to analyze this data set, multivariate/chemometric methods will be useful. Recent advancement of LIBS instrumentation for the study of meteorites, depth penetration in Martian rocks and its regolith proved the feasibility of LIBS used as robotic vehicles in the Martian environment.

**Keywords:** LIBS, Gemstone, geological samples, Extra-terrestrial

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