Laser-induced breakdown spectroscopy (LIBS): a review

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Laser-induced breakdown spectroscopy (LIBS) is a technique based on the detection of the optical atomic emission spectrum resulting from the de-excitation of a plasma created at the sample surface after laser ablation. LIBS requires the use of pulsed laser and gated detector since the transient plasma emission is temporally short. It allows fast and stand-off measurements with little or no sample preparation.

From laser ablation to plasma expansion and cooling, the principal physical processes involved in LIBS will be commented in the first part as well as the typical values of relevant parameters.
Then, a selection of both scientific and commercial LIBS setups and the international LIBS community in 2018 will be presented.
In the last part, a review of selected LIBS applications will be commented, with particular emphasis for geology, environment and agriculture, cultural heritage and forensics.

As a conclusion, a vision of the future of LIBS will be drawn, with a particular interest on LIBS imaging.