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Laser-induced breakdown spectroscopy (LIBS) in cultural heritage

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Laser-induced breakdown spectroscopy (LIBS) is a versatile technique that provides nearly instant elemental analysis of materials, both in the laboratory and in the field. This is done by focusing a short laser pulse on the surface of the sample, or object, studied and analysing the resulting spectrum from the laser-induced plasma. LIBS has been

and controlled through a laptop

artefacts from archaeological excavations
(Fig. 5).
Sampling: the technique can be used

review, *J. Anal. Spectrosc.*, 2019, **34**, 81–103.

- 4 D. Anglos and V. Detalle, Cultural Heritage Applications of LIBS, in *Laser-Induced Breakdown Spectroscopy – Technology, Applications, Spectroscopy*, O. S. , ed. S. Musazzi and

Several commercially available LIBS instruments provide some spectral recognition features, while several research groups have developed custom-made software that enables simulation of emission spectra.

Conclusions – outlook

LIBS is a versatile technique that can be used in the characterization of many types of heritage materials, rapidly providing information on their elemental compositions. Being mobile, LIBS facilitates analysis at diverse locations and this can be valuable at several stages of archaeological research and conservation campaigns and studies. Close interactions between members of the heritage (archaeologists, historians and conservators) and analytical communities will be needed for exploiting the potential of LIBS.

Safety

The operation of laser equipment requires proper training and the use of protective eyewear.

Further reading

- 1 Various articles on LIBS analysis and instrumentation in: <http://www.spectroscopyonline.com/libs-0>.
- 2 The use of LIBS for the analysis of archaeological objects and artefacts: <http://www.science4heritage.org/COSTG7/booklet/chapters/libs.htm>.
- 3 A. Botto, B. Campanella, S. Legnaioli, M. Lezzerini, G. Lorenzetti, S. Pagnotta, F. Poggialini and V. Palleschi, Applications of laser-induced breakdown spectroscopy in cultural heritage and archaeology: a critical