

LIBS analyses for industrial applications

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Abstract

Measuring distances in the range between a few centimetres to a few metres are of special interest for automated industrial LIBS applications. They allow for a reliable optical access to measuring objects in a process line under harsh industrial environments. In that range a compromise can be found between the conflicting requirements with respect to the protection of the optics facing the measuring object versus sufficiently high laser irradiance and high receiving solid angle of the measuring radiation.

A concise overview about published LIBS studies focused on industrial applications or perspectives for these is given. Recent R&D activities in the field of automated LIBS for industrial applications are presented focusing on the following application cases: a) combined use of inline measured 3D geometry information and LIBS analyses for high-speed sorting tasks of piece goods; b) sorting of refractories, c) identification of steel blooms in a rolling mill, d) inverse production scenario for the recovery of valuable materials from electronic equipment.

For measuring distances of only a few centimetres the size of a LIBS instrument can be downscaled significantly allowing to set up handheld LIBS analysers. Whereas the precursors of such concepts were studied already more than fifteen years ago, quite recently a competitive market arose where various models of handheld LIBS systems are offered. Industrial application fields are mainly positive material identification of metals and the sorting of light metal scraps for recycling purposes. A comparative synopsis of features of these LIBS systems will be presented and arising research themes in this context are outlined.