



LASER DETECTION OF ELECTRONIC COMPONENTS

Task

To recover valuable raw materials from old electronics, the industry must be able to identify the electronic components in which these raw materials are present in high concentrations. This chemical, component-based information is generally not available on the marketable electronic devices themselves. For this reason, automated solutions to recognize components and evaluate their recyclable content are necessary to extract these parts selectively and process them in separate fractions.

Method

Fraunhofer ILT is coordinating the joint European project »ADIR«, in which technological solutions are being developed in order to efficiently recover the recyclable materials. For this purpose, the project partners are developing automated processes to identify the physical and chemical properties of valuable assemblies and selectively extract corresponding electronic elements.

Results

A combined method is used to detect the composition of an electronic component without contacting it. First, a pulsed laser beam penetrates the housing of the components locally. The subsequent analysis of the internal structures is carried out by the process of laser-induced breakdown spectroscopy (LIBS). The beam paths for laser excitation and detection are

aligned quickly and precisely to individual positions of an electronic circuit board. As a result, a large number of electronic components can be examined in a short period of time. The positions of the components to be examined are obtained from high-resolution two- and three-dimensional imaging. The inline measured data on size, position and chemical composition are finally used for evaluation, targeted sampling, sorting and subsequent processing. The developed inspection procedures were combined in one machine and linked together. The ADIR demonstrator is currently undergoing field trials at a recycling company.

Applications

Since the fast and non-contact analysis can capture location-dependent physical and chemical quantities inline, it opens up a new data space for both production as well as inverse production. The application potential ranges from characterizing natural raw materials through inspecting the quality of metallic components and semi-finished products all the way to discovering recyclables themselves.

The work is being carried out as part of the EU project »ADIR« under grant number 680449.

Contact

Dr. Cord Fricke-Begemann
Telephone +49 241 8906-196
cord.fricke-begemann@ilt.fraunhofer.de

Prof. Reinhard Noll
Telephone +49 241 8906-138
reinhard.noll@ilt.fraunhofer.de

3 Measuring machine for the EU project »ADIR«.
4 Laser spectroscopic measurement on a circuit board of a mobile phone.