

Next generation urban mining – Laser-based sensing and sorting of electronic scrap

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Abstract

An overview will be presented on current R&D activities of the European project ADIR – running since 9/2015 - dealing with the automated disassembly, identification, separation and recovery of valuable materials from electronic equipment. Main focus are end-of-life cell phones and printed circuit boards from server and network electronics.

To date, the material specific recycling is mainly focused on mass stream concepts such as shredder processes and metallurgy to extract the high-value metallic constituents, i.e. copper, gold and silver. However, a series of critical elements cannot be recovered efficiently or are even lost in dust or residual fractions.

The goal of ADIR is to demonstrate the feasibility of a key technology for next generation urban mining in the scope of inverse production concepts. An automated disassembly of electronic equipment is worked out to locate, separate and recover valuable materials. The concept is based on image processing, robotic handling, pulsed power technology, 3D laser measurement, real-time laser material identification (to detect materials by laser spectroscopy), laser processing (to selectively desolder electronic components and to cut off parts of a printed circuit board) and automatic separation into different sorting fractions.

A machine concept was worked out being capable to selectively disassemble printed circuit boards and cell phones with short cycle times to gain sorting fractions containing high amounts of valuable materials. Examples are those materials with high economic importance and supply risk such as tungsten and neodymium.