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A study of liberation and separation process of metals from printed circuit boards (PCBS) scraps

Abstract

Since the metallic elements are covered with or encapsulated by various plastic or ceramic materials on printed circuit boards (PCBs), a pre-treatment process allowing their liberation and separation is first needed in order to facilitate proficient extraction. In this work, a fundamental study has been carried out to recover metallic concentrates from PCBs scraps. The most important step is to separate or release particles from the associated gangue minerals at the possible liberation particle size. The samples of printed circuit boards were separated into the magnetic and non-magnetic fractions by Rare-earth Roll Magnetic Separator. Then, the magnetic and non-magnetic fractions were separated to heavy fraction (metallic elements) and light fraction (plastic) by Mozley Laboratory Table Separator. Results show that the unliberated particles still remain in the comminution fines PCBs. The use of Rare-earth roll magnetic separation was clarified that the Fe, Ni and Zn element tend to be condensed in magnetic particles. Meanwhile Cu element tends to be release in non-magnetic particles. Mozley Laboratory Table Separation was capable to obtain fractions with relatively high concentrations of metallic elements. This study is expected to provide useful data for the efficient physical separation of metallic components from printed circuit boards scraps.

Keywords; Comminution, Gravity Separation, Liberation, Magnetic Separation, Printed Circuit Boards (PCBs) Scraps