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## **INNOVATIVE TECHNOLOGIES FOR METALS RECOVERY AND PLASTIC VALORIZATION FROM ELECTRIC AND ELECTRONIC WASTE: AN INTEGRATED APPROACH**

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### **Abstract**

The increasing diffusion of Hi-tech complex products has raised the attention of scientific community towards their End of Life (EoL) treatment, both in terms of assuring an appropriate disposal, to avoid the dispersion of harmful substances, and at the aim of their exploitation as valuable sources of raw materials. Within this study an integrated approach for waste electrical and electronic equipment (WEEE) end of life treatment is proposed based on the integration of hydrometallurgy for metal recovery and pyrolysis for plastic fraction valorization, with a particular focus on EoL personal computers. An innovative hydrometallurgical process with limited environmental impact for the recycling of added value metals (Au, Ag, Cu, Sn, Pb) from printed circuit boards was developed and thermal technologies were investigated for the valorization of mixed plastic components. The results show metal recovery rates up to 99% and purity grade up to 99%. With reference to plastic valorization, the maximized production up to 95% w/w of both a liquid and gaseous hydrocarbon-based stream to be exploited as a fuel or as source of chemicals was achieved from WEEE plastic fractions.

*Key words:* hydrometallurgy, mixed plastic, personal computers, printed circuit boards, raw materials, recycling, recovery, thermal technologies, WEEE

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