

Mechanical recycling process of FPDs for indium powder concentration

Within the RECYVAL-NANO, the first objective was focused towards regaining of critical metals from Flat Panel Displays wastes. For this purpose, Coolrec, one of the European companies leading in waste management and recycling has been working in the development of their Flat Panel Displays (FPDs) recycling process. The treatment facilities of Coolrec Belgium located in Tisselt (Belgium) were made available for the project development. This plant has a treatment capacity of 800-900 kg/hour.



Figure 1. FPDs recycling line, pre-disassembly operations

In order to increase the recovery and purity of the fractions of interest, Coolrec developed some significant modifications in the pre-disassembly process of the FPD-line giving to the selection of different extracted fractions along the FPD recycling process which were assessed during the project for metal recovery and revalorization. RECYVAL-NANO has been working over the following target fractions:

- The FPD panels or FPD plates which were manually disassembled in the preliminary stages of the recycling line. These panels contained indium in high quantities and their disassembly allows avoid metal impurities. In addition, the Coolrec recycling process including these manual disassembly fractions is still profitable with the manual operations. Additional mechanical refining was developed in this stream by partners Coolrec and MOS as it is explained in the section below.
- Dedusting processes made in FPD recycling line gives a mixed powder output stream resulting from the crushing process from a mixture of parts of FPD waste. This powder contains many metals, some of them which are valuable like yttrium, europium, indium, but also gold. Further refining of this stream during the project was assessed only by chemical extraction processes.

REFINING OPERATIONS FOR INDIUM EXTRACTION

Coolrec and MOS optimised a dual process in order to process the FPD panels disassembled. **By combination of a shredding plus a spinner system, it has been achieved the reduction of size while maximizing the separation of the indium coated glass from the rest of the panel.**

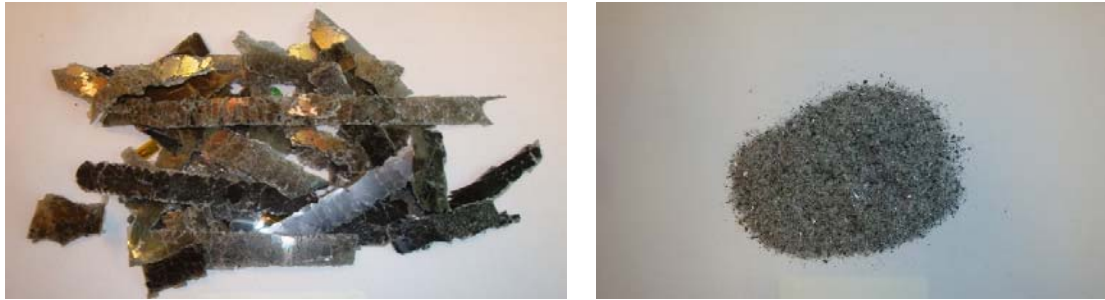


Figure 2. Output fractions after first shredding step



Figure 3. Output fractions after second spinning step

The metal analyses contents indicate that powders obtained after shredding and spinning were more concentrated in indium than the strips, concluding that most of the ITO coating ends in the powder output. This fraction is a valuable output as indium is present in higher quantities (> 400 ppm) and as the main metal in the stream, with iron as main impurity and others like Mo, Sn, Zn, Cu and Ni in a lower order. After this process, the fraction was suitable for extraction by chemical methods.



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Development of recovery processes for recycling of valuable components from FPDs (In, Y, Nd) for the production of high added value NPs



INTEREST ON EXPLOITATION

The Recyval consortium is interested in making available to third parties these technologies developed under the project in several ways:

- a) Sale of Know How: The relevant Recyval partners make process technology available under licence for the leaching process as developed.
- b) Sale of equipment: The relevant Recyval partners supply equipment and know-how under licence.
- c) Joint research: The relevant Recyval partners will contribute Recyval Foreground to new research projects on terms to be agreed.

Third parties interested in any of the above should in first instance contact to:

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giving information on their areas of interest