

## **Management of zinc production wastes for recovery of germanium**

*Michał Drzazga, Mateusz Ciszewski, Sylwia Kozłowicz, Sebastian Kulawik, Adrian Radoń,  
Izabela Maj, Sonia Kasierot, Patrycja Kowalik, Karolina Goc, Katarzyna Klejnowska,  
Wojciech Mikołajczak*

*Łukasiewicz Research Network – Institute of Non-Ferrous Metals  
ul. Sowińskiego 5, 44-100 Gliwice, POLAND*

Germanium is an important element used in crucial industry sectors like optical fibers for telecommunication or IR optics for night vision systems. However, its global output is limited and not uniformly distributed worldwide – ca. 2/3 of global output comes from China. It is estimated that its annual global production is ca. 140 tons. Therefore, many world economies consider it as a critical raw material. One of the potential sources of germanium is zinc metallurgy. It is assumed that only 3% of germanium present in processed zinc ores is recovered nowadays. Therefore, it is important to find new, more efficient ways to recover germanium from by-products and wastes associated with zinc metallurgy.

One of the steps of electrolytic zinc production is the purification of crude zinc electrolyte. During this process several by-products and wastes, including a copper cake are generated. It was found that the copper cake may contain elevated germanium concentrations (200-400 ppm Ge). The process for germanium recovery from the copper cake was proposed. It is composed of two-stage leaching (under non-oxidative and oxidative conditions) followed by precipitation of germanium in the form of germanium-tannin concentrate. The technology allows to achieve 80-90% of germanium recovery from the cake.

*This activity has received funding from the Polish National Centre for Research and Development within LIDER XI programme (grant no. 43/0159/L11/19/NCBR/2020) "Innovative technology for germanium recovery from wastes of Polish zinc metallurgy".*