Mineralogical and chemical quantification of waelz slag

PETER ONUK

[1]Montanuniversität Leoben, Peter Tunner Strasse 5, A-8700 Leoben Austria

Globally, roughly 1.75 million tons of waelz slag per year are produced from 35 waelz kilns. The increasing costs for landfilling, changing environmental concerns and a focus on sustainable production foster an investigation of this by-product to investigate if at least parts of it can be used as a raw material.
Waelz slags are highly variable in the shape of the phases within the different samples, ranging from euhedral to spherical habitus. The variation in phase chemistry within the different samples is marginal. The main phases of `normal` waelz slag are spinel solid solutions with different endmembers in the Zn-Mn-Mg-Cr-Ca system, followed by belite (C2S), wustite and metallic iron. Sphalerite, chromium spinel, alite (C3S), aluminate and zinc oxide can be considered as minor or accessory phases. The differences in the feed material (stainless steel filter dust) can be correlated with the increased amount of Ni (up to 3 wt%) in metallic iron phases. Waelz slag that was treated with compressed oxygen and subsequently cooled in air shows differences in phase habitus (mostly euhedral) and phase chemistry (absence of wustite and metallic iron).
The characterization of waelz slags involves several analytical steps. However, reflected light microscopy and SEM phase identification are obligatory.