# Flotation muds as secondary raw materials in ceramic production: a preliminary study

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# ABSTRACT BOOK

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# Flotation muds as secondary raw materials in ceramic production: a preliminary study

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Recovery and recycling of valuable materials from industrial waste is one of the main goals in present society. Most natural resources are not renewable (at least at the human time scale), and their availability is running out. The reuse of industrial wastes has the further benefit of limiting landfill disposal. In this respect, recovery of wastes containing precious metals is of primary interest not only in the jewellery industry, but also in the electronics and catalysts industrial sectors. Here we present a preliminary feasibility study focused on flotation muds (FM) derived from precious metals recovery processes. In close collaboration with an Italian innovative start-up, engaged in waste recycling and circular economy sectors, we explored the possibility to reuse FM as secondary raw material (SRM) in the production of thermoformed ceramic products. Two different FM samples have been analysed to determine their chemical and mineralogical characteristics. Subsequently, following a patented process technology, we use exceptionally high amounts of FM (up to 70-85%) to produce ceramic specimens. The latter were finally investigated by means of scanning electron microscopy (SEM-EDS), X-ray diffraction (XRD), X-ray Fluorescence (XRF), high resolution micro-computed tomography (micro-CT) to evaluate their chemical, mineralogical and microstructural (internal porosity, microfabric) features. Moreover, additional tests were carried out to determine the physical and mechanical characteristics of samples with the aim of determining their compressive and flexural strength and frost resistance. In addition, also aggregates from ceramic products were prepared to determine their wear resistance. The main crystalline phases in the ceramic products are gehlenite, anorthite, augite in one sample and diopside, nepheline, anorthite in the second sample. The overall microstructure is very similar to traditional ceramics, where the crystalline grains are associated with minor amorphous matrix and pores with variable size. Our preliminary results confirm that this kind of waste can be successfully re-used in the ceramic industry, resulting in products with high technological performances and competitive with respect to traditional ceramics.