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Abstract Title:

Experimental evaluation of Microwave systems for minerals dewatering

Abstract:

Drying is a critical step in the processing of minerals, with substantial energy demand, resource cost, and greenhouse gas emissions. In this work, the performance of microwave systems for drying minerals was experimentally investigated. Different materials with distinct chemical compositions and moisture contents ranging from 5% to 25% were chosen and their thermophysical and electromagnetic properties, including dielectric loss, thermal conductivity and heat capacity were characterized. Materials were incrementally heated in a 2.45 GHz microwave oven with subsequent measurements of mass loss and surface temperature until certain mass losses were attained. The dry materials showed minimal interaction with the applied electromagnetic field, but with discernible energy exchange in the presence of moisture which points to the potential of microwave systems in the drying of materials. Results showed a consistent drying rate up to a critical moisture content, followed by a falling rate regime. Conventional drying methods face challenges in reaching and surpassing the critical moisture content, often requiring prolonged residence times. These findings show that microwave heating is an excellent alternative for drying applications in mining with low net energy demands and greenhouse gas emissions.

Preferred Symposium:

Joe Ferron Memorial Symposium – Processing of Critical Materials

Presentation Type:

Student Oral Presentation

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Microwave Drying Systems; Minerals; Dewatering; Zero Emission; Decarbonization

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