

PEPT study of minerals recovery using froth flotation

At the heart of most mineral processing plants is froth flotation which is a physico-chemical separation method depending on differences in wettability between the valuable mineral and the non-valuable material. Air bubbles are introduced into a ground slurry where chemical reagents have been added to enhance the hydrophobicity of the desired mineral and exploit primarily the differences in the exposed surface properties. Coarse particle flotation has lately become attractive due to the lower energy requirement for particle size reduction. We study a separator which has anecdotally been shown to produce results that are economically attractive for coarse sized particles.

This device is formed by a combination of fluidized bed and column flotation principles: hydrophilic particles are deemed heavy and follow a tortuous path downwards in the cell and settle in the lower dewatering zone and eventually are released as tailings for further downstream processing. In this work Positron Emission Particle Tracking (PEPT) is used to investigate the particle motion and its dynamic perturbation. PEPT is a Lagrangian single-particle tracking method used to measure the dynamics of a suitable radionuclide tracer introduced to the system. The particle size used for this study is +150 μm diameter and the fluid-particle interaction in the system is investigated to gain a deeper understanding of the underlying physical principles in its operation.

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