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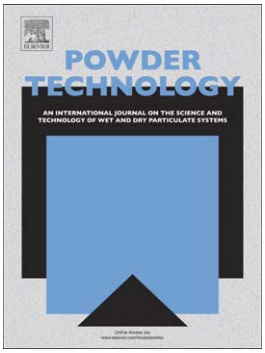

Effect of grinding media on the surface property and flotation behavior of scheelite particles

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Effect of grinding media on the surface property and flotation behavior of scheelite particles

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Abstract: Grinding for mineral liberation is a prerequisite for a successful flotation separation. Different grinding media produce mineral particles with different surface properties and flotability. In this study, the surface properties and flotation behavior of scheelite particles having a size of -74 + 38 μm produced by ball and rod mills were studied through single mineral flotation experiment, scanning electron microscopy (SEM) observation, wettability measurement, and X-ray diffraction (XRD) test. The wettability and flotation results showed that, compared to ball mill particles, the rod mill ones have a lower critical surface tension and thus a greater hydrophobicity when treated with the collector solution, and accordingly perform a better flotation recovery using oleate as the collector. In addition, the rod mill particles have a smaller specific surface area, and the full monolayer adsorption of the collector on their surfaces is achieved at a lower oleate concentration. The SEM observations demonstrated that the rod mill particles possess larger elongation and flatness values, which are beneficial for the attachment of air bubbles to. The XRD observations revealed that both mill particles have similar expose intensity of abundant {112} surface. However, rod mill particles have more {101} surface exposed, while the ball mill particles have more {001} surface exposed, leading to a stronger interaction of the collector with rod mill particles. Owing to the stronger interaction with the collector and the easier attachment to air bubbles, the rod mill scheelite particles are more hydrophobic and have a higher flotation recovery. These findings will help establish the relation between the particle surface properties and the grinding media, and provide guidance for optimizing flotation separation.

Key words: scheelite, flotation, grinding, wettability, oleate, shape index

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