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Advances in the Theory and Technology of Physical Separation

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Physical separation remains one of the most fundamental and widely applied approaches in mineral processing and resource recovery, underpinning the efficient exploitation of primary ores, secondary resources, and industrial wastes. From early gravity-based methods to modern magnetic, electric, and sensor-based technologies, physical separation techniques have continuously evolved in response to increasing resource complexity, declining ore grades, and growing environmental constraints. Advances in material characterization, process modeling, and equipment design have significantly expanded the applicability and performance of physical separation, enabling more selective, energy-efficient, and environmentally responsible processing routes. In the context of sustainable development, physical separation plays a critical role in improving resource utilization, reducing reliance on chemical reagents, and lowering energy consumption across mineral and metallurgical value chains. Ongoing research continues to refine separation theories, enhance efficiency at fine and ultrafine particle sizes, and integrate downstream processing technologies. This Special Issue focuses on the recent scientific and technological developments in physical separation, encompassing both theoretical advances and practical applications. Topics of interest include gravity separation mechanisms and applications, magnetic separation theory and equipment development, electric separation technologies, particle classification, size-based separation, and emerging and hybrid physical separation methods.



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