Chapter 8
Advances of Nanotechnology Applications in Mineral Froth Flotation Technology

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Summary
Nanomaterials have generated a great deal of interest for technological applications in many fields such as mineral processing, water and wastewater treatment, nanomedicine, nanoelectronics, agriculture, renewable energy, nanocatalysis and so on. The successful application of nanostructured materials for any tailored application is dependent on size, structure, morphology, level of purity and environment of application. This chapter highlights the various nanomaterial synthesis and characterization techniques pertinent for successful generation of nanomaterials for application in the domain of mineral processing using froth flotation. Emphasis is put on the need to understand mineral classification and physicochemical properties of runoff mine ore to allow for control or fine-tuning of nanomaterials properties for anticipated positive industrial or practical applications in the froth flotation. The chapter also briefly discusses the importance of performing toxicological studies and the need to generate Material Safety Data Sheets (MSDS) of new nano-enabled flotation reagents to ensure safe handling and use.