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## Low-Energy Desalination Technologies for Treating Mining Effluents

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As our societies evolved and the quality of primary resources deteriorated, water use in process circuits has led to the generation of ever-increasing volumes of contaminated effluents. Despite the efforts for water recycling in process circuits, desalination technologies fail to treat solutions of high salinity, due to their focus on dilute solutions, such as seawater. The lack of energy efficient effluent desalination technologies leaves vast volumes of aqueous residues sitting in tailings ponds. This practice often allows oxygen to dissolve in water and oxidize certain elements, which leads to the generation of acid in a sequence of events known as acid mine drainage. Uncontrolled discharges resulting from such mining wastes have detrimental effects on the nearby water quality and aquatic ecosystems as well as on the health of the people of the local communities. In this work, we report on novel freeze desalination processes that can recover clean water from such industrial effluents in the form of ice at significantly lower energy compared to state-of-the-art desalination processes. Therefore, the developed technologies promise to economically and efficiently reduce the water-consumption related environmental footprint of the processing industry, the risks and liabilities associated with tailings ponds, as well as to secure access to safe clean water for nearby communities.