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Microbially induced carbonate precipitation for the recovery of critical metals from lithium-ion battery bioleachate

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The increasing generation of electronic waste represents a significant secondary source of base and critical metals. Among the biohydrometallurgical technologies that are currently being researched, microbially-induced carbonate precipitation (MICP) is emerging as a promising metal recovery technique and is increasingly attracting interest. However, to the best of our knowledge, the treatment of e-waste bioleachates via MICP has not yet been investigated. This study proposes to fill this gap and investigates the application of MICP to precipitate critical and base metals (cobalt, lithium, manganese, and nickel) from lithium-ion battery bioleachates. An ureolytic bacteria, *Sporosarcina pasteurii* DSM33, was cultured in continuous mode, the culture medium (NH_4-YE) was modified to optimize urease activity and the culture was monitored by combining pH, dO_2, N-NH_4, and CO_3^{2-} measurements. High concentrations of metals in the culture medium have been shown to inhibit growth and activity. Precipitation experiments performed on synthetic solutions have yielded recoveries ranging from 70 to 100% for Co, Mn, and Ni. Precipitates were characterized as a mixture of carbonates and amorphous hydroxides. Further experiments are proposed for a better understanding of MICP underlying mechanisms and process optimization.