

Precise Electrochemical Metal Recovery from Emerging Waste Streams

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Abstract : Efficient and selective metal recovery from emerging solid waste, such as spent lithium batteries, electronic waste and SCR catalysts, is of great importance from both environmental and resource considerations. In order to overcome the bottlenecks of long flow-sheet and severe secondary pollution in conventional processes, the rational design of 2-electron oxygen reduction reaction (ORR) and capacitive deionization (CDI) nanomaterials were developed for the precise electrochemical metal recovery. It has been demonstrated that the modified carbon nanomaterials can be employed as 2e ORR to produce H₂O₂ in aqueous solution, in which the metal can be leached out from the solid waste as ions. Moreover, the multi-component metallic solution can be electrochemically extracted with good efficiency and selectivity with the nanoporous aerogel. Each system presents stable performance for long-term operation and can be used in industrial solid waste treatment. This study provides a materials-oriented, cleaner metal recovery approach for strategic metal resources sustainability.

Keywords : electrochemistry, metal recovery, waste streams, nanomaterials

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