Development of a sustainable Zinc-air battery from Industrial waste

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Global energy and commodities consumption rises as the world's population expands and living standards rise. On the one hand, waste output is increasing due to the use of natural resources. Because of the rising human influence on the environment caused by industrial growth, it is estimated that 1.5 Planet Earth will be required in the twenty-first century to maintain our social, economic, and demographic existence (WWF, 2012). Reusing and recycling materials can help to conserve biodiversity by reducing the impact on nature and habitats, reducing the use of natural resources, and reducing the use of natural resources.

Zinc dross is a by-product of galvanizing facilities throughout the globe. In addition to iron, lead, and silica, it contains a significant amount of zinc, over 80%. When steel is galvanized, more than 25% of the zinc metal is converted to zinc residue. This zinc dross is considered waste because it cannot be utilized in the galvanizing furnace. Zinc can be extracted from debris through both hydrometallurgical and pyrometallurgical processes. However, hydrometallurgical processes are relatively pure and adaptable to small and medium-sized businesses.

Evolving for centuries, zinc-air battery technology has recently attracted renewed interest. With a high storage capacity and a fraction of the price of lithium-ion batteries, zinc-air batteries are one of the least expensive options for propelling electric vehicles of the future. In this study, a hydrometallurgical process is used to recover zinc from zinc refuse discarded by a galvanizing facility. Recovered Zinc was used for the electrodes of the Zinc-air battery, ensuring future research directions to extend sustainable growth development, albeit at the expense of manufacturing energy and cost compared to existing technology.

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