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Broader Context

High performance dual-electrolyte based magnesium-iodine batteries that can harmlessly resorb in the environment or in the body

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Given the upward trajectory of global battery consumption, resulting waste streams cannot be overlooked. Spent batteries enter landfills at alarming rates and represent a growing societal challenge. Incorrectly disposed batteries result in toxic materials leakage in ground water and soil, and the production of hazardous gas and accidental fires. This article describes a battery technology that addresses these challenges by exploiting the emerging class of physical transient biocompatible materials to offer capabilities that avoids the generation of any battery waste. Specifically, these high-performance magnesium-iodine eco- and bio-resorbable batteries completely dissolve in the presence of aqueous media, such as ground water, rainwater, or body fluids to resorb naturally and safely into the environment. The unconventional ionic liquid/aqueous media dual-electrolyte design imparts the eco/bioresorbable magnesium-iodine cell with voltage outputs and volumetric energy levels that exceed any alternative, such that its high voltage output (> 1.8 V) and high power density meet the power requirements of microcontrollers and Bluetooth system on a chip devices, which has previously not been achievable without boost converters or additional electronic components. The proposed battery utilizes bioresorbable concepts to achieve an environmentally-friendly battery chemistry that obviates the production of waste streams.

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