Improving Zinc-Air Productivity in Rechargeable Batteries (IZAP-R)

PI: Janice Alexander, Flathead Valley Community College
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In partnership with Zinc Air, Inc. (ZAI), Flathead Valley Community College (FVCC) will initiate a line of research intended to improve the ability to recharge zinc-air batteries. There will be two basic threads to this research. The first will develop metrics for and investigate the morphological change and subsequent deterioration of zinc electrodes, tracking capacity fade, Coulombic efficiency, and energy efficiency. The second thread will evaluate the impact of introducing select polymers dopants to retard the complete dissolution of oxidized metal and suppress side reactions during cell discharge. This second thread of research is designed to mitigate anode morphological change and dendrite formation during the recharging process. Engaging undergraduate research assistants, industry experts and FVCC faculty will develop chemistries and methods to build rechargeable zinc-air batteries and fuel cells to power aircraft, automobiles, and small appliances.

This research is critical to expanding the field of knowledge surrounding the use of zinc-air batteries which in turn have shown significant potential in aeronautical and space applications. Zinc-air batteries produce higher specific energy and specific power than existing lithium-based batteries at a reduced cost while mitigating many of the safety concerns of our present battery technologies. At present, however, the zinc based technology has a major limitation: zinc-air batteries are not electrochemically rechargeable. Upon discharge the zinc electrode dissolves as it oxidizes to water- soluble hydroxides and successive cycles of battery recharging results in significant changes in electrode morphology with affiliated reductions in energy storage capacity.

Contact Info

Mail	Janice Alexander Department of Chemistry Flathead Valley Community College Kalispell, MT 59901	**E-mail:**	jalexand@fvcc.edu
		Phone:	(406) 756-8948