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Synthesis and Characterization of Neat Redox-Active Ionic Liquids for Energy Storage Applications

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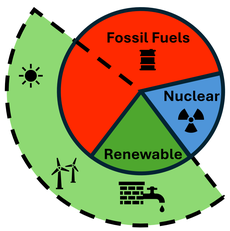
CHRISTCHURCH NEW ZEALAND

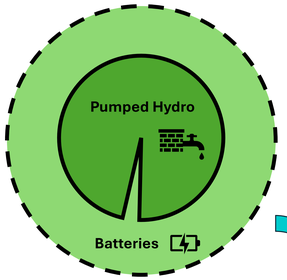
Introduction

Current Power Generation



Future Power Required

Current Energy Storage

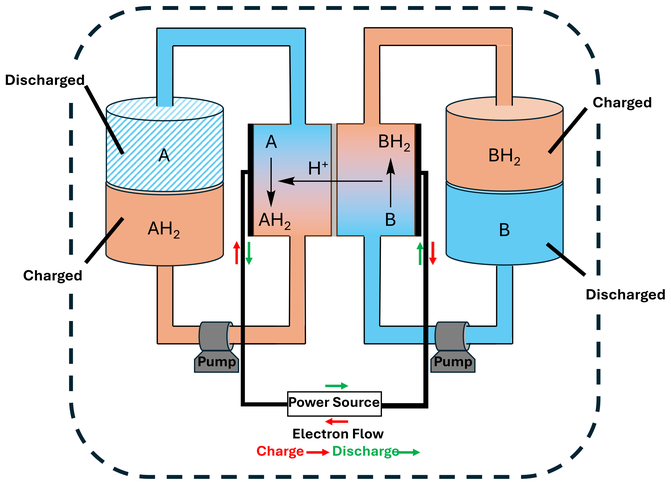


Future Energy Storage Required

Pros and Cons

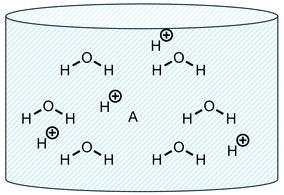
	Energy Density	Sustainability	Development Prospects
Li-ion			
Lead Acid			
Nickel Metal Hydride			
Redox Flow Battery			

Redox Flow Battery Charging Process



Methods

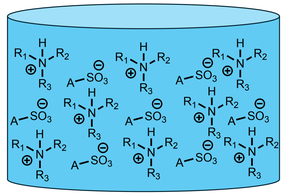
Existing Dilute Aqueous Electrolytes



Increased Energy Density

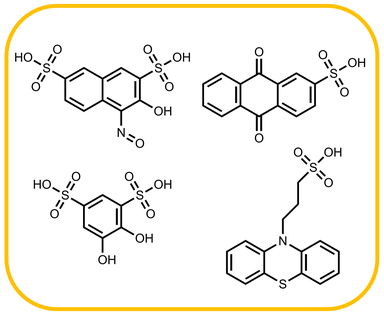
Increased Concentration Of Redox Active Species

Proposed Neat Ionic Liquids



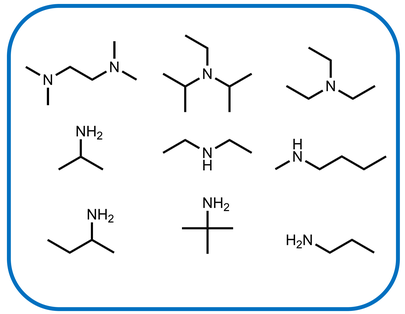
Acidification and Neutralization

Redox Active Species



Organic Acids

1º, 2º, 3º Amines

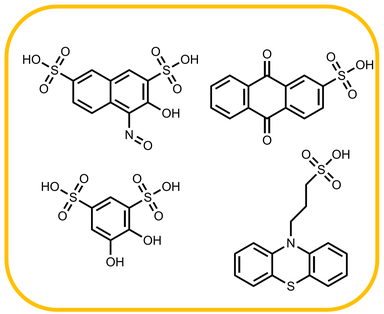


Organic Bases

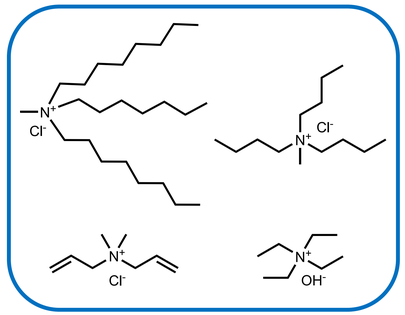
Library of redox-active ionic liquids

Metathesis

Redox Active Salts

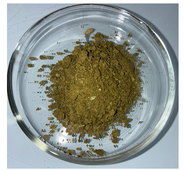


4º Ammoniums

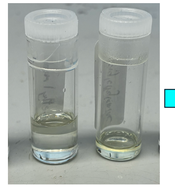


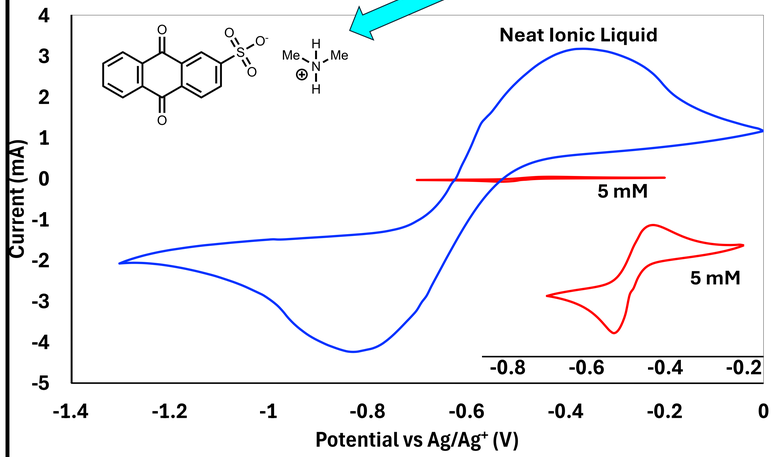
Results

Anthraquinone-2-sulphonic acid



1º, 2º, 3º Amines





Concentration "A"	$E_{1/2}$ (V)	Current (mA)
5 mM	-0.48	0.064
~3 M	-0.62	4.337