Aqueous All-organic Redox Flow Battery
Technology #16743

Applications
This technology is applicable for large-scale energy storage such as load-balancing the electrical grid and storing energy from intermittent renewable sources.

Problem Addressed
Flow batteries are currently limited by low energy density, low efficiency, and high costs. This technology develops a lower cost, higher energy capacity flow battery suitable for large-scale applications.

Technology
A major cost associated with flow batteries is the chemical cost of the electrolyte. Using water, which is much cheaper than other solvents, would be a cost-effective approach. However, current aqueous redox chemistries employ transition metal salts that have low solubility in water, limiting the capacity of the flow battery, and are often expensive. Together, this combination increases the overall cost of the battery system. This technology uses quinoxaline-based organic molecules instead of transition metals as the redox chemistry. These organic molecules are much more soluble in water, which allows for more concentrated electrolyte and increased battery capacity. The organic molecules can also store two electrons per molecule, further increasing capacity. Additionally, unlike the metal-based chemistries, the quinoxaline-based chemistries do not require strongly acidic or alkaline conditions so the battery can be constructed out of plastic instead of more expensive corrosion-resistant materials.

Advantages
- High energy storage capacity
- Lower cost than metal-based flow batteries
- Improved safety characteristics

Categories For This Invention:
Energy
Energy Storage
Batteries
Flow Batteries
Power Plants

Intellectual Property:
Materials for use with aqueous redox flow batteries and related methods and systems
Issued US Patent
9,812,883
Materials for use with aqueous redox flow batteries and related methods and systems
US Patent Pending
2018-0102660

Inventors:
Fikile Brushett
Jarrod Milshtein
Liang Su

External Links:
Brushett Research Group
https://www.brushettresearchgroup.org/

Image Gallery: