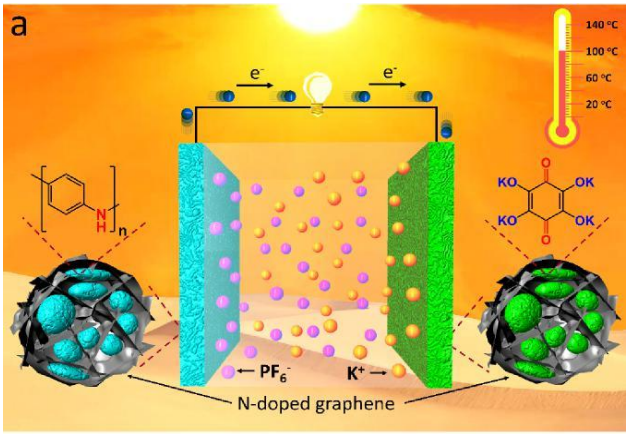
All-Organic Rechargeable Potassium Ion Battery

Researchers at George Mason have invented transition-metal-free all-organic rechargeable potassium ion batterys (RPBs) based on abundant and sustainable organic electrode materials (OEMs) for fast-charging and high-temperature applications. The invented RPBs have many advantages over the Li-ion batteries in terms of sustainability, carbon-footprint, and functional characteristics. In addition, the invented RPBs overcome many of the known difficulties associated with potassium ion battery technologies. Advantages of the invented RPBs in comparison to the Li-ion batteries:

1. RPBs use abundant and sustainable organic electrode materials, unlike the Li-ion batteries which use transition metals based electrodes (transition metals are rare, difficult to mine, create resource and technology dependence on the few countries mining them).
2. RPBs use abundant potassium resources (2.9% in the earth's crust) instead of the much more limited Lithium resources (0.0017% in the earth's crust).
3. RPBs have a significant lower carbon-footprint than the Li-ion batteries.
4. RPBs are fast-charging (<15 min for full recharge) which is significantly faster than the current state-of-the-art Li-ion batteries.
5. RPBs can work at high-temperatures (>60°C) which is significantly higher than Li-ion batteries.

This work demonstrates promising cell configuration for fast-charging, high-temperature and sustainable energy storage devices with high capacity and superior cycle life. We anticipate that these RPBs will soon become state of the art for the large-scale application of energy storage devices in electric vehicles, grid scale electrical energy storage, and high temperature regions.



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