Promoting high energy cathodes for solid state sodium metal batteries

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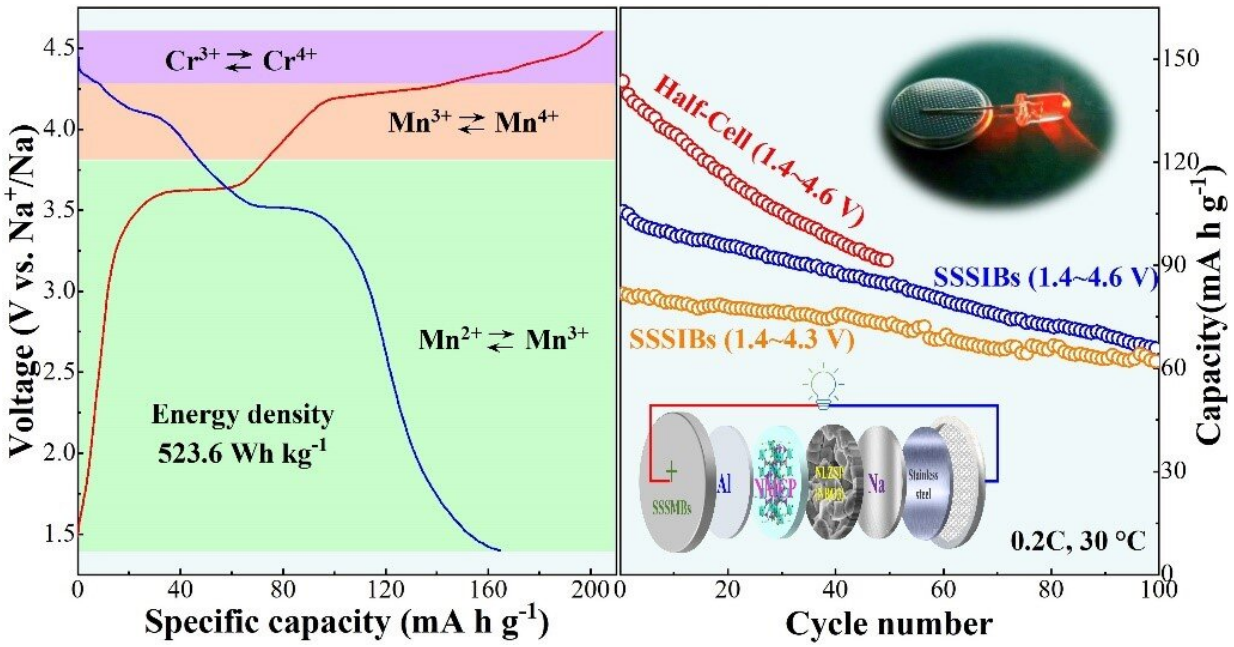

Scientists from Nanjing University of Posts and Telecommunications developed SSSMBs using a high energy $Na_4MnCr(PO_4)_3$ cathode. Credit: Zhongyue Wang, Nanjing University of Posts and Telecommunications

A team from China has broken new ground in the development of sodium ion batteries (SIBs.)

"The development of high safety and high energy density SIBs is imperative," said paper author Zhongyue Wang, lecture with the College

of electronic and optical engineering & college of flexible electronics (future technology), Nanjing University of Posts and Telecommunications. "Currently, great progress has been made in sodium-ion batteries, but their energy density is still much lower than LIBs limited by the cathode."

Wang explained that NASICON-type phosphate ($Na_xMM'(PO_4)_3$, M, M' =transition metal Ti, V, Cr, Mn, Fe, Co and Ni) is regarded as the most competitive high energy cathode benefiting from its stable structure, 3-D open frameworks and structural diversity.

"$Na_xMM'(PO_4)_3$ contains an enormous Na reservoir with potential for up to four extractable Na; however, it is uncommon to perform reversible extraction/insertion of more than two Na ions," Wang said. "One/two-electrons electrochemical reaction per formula unit makes most phosphate cathode provide low energy density (5 V)," Wang said.

"There is still a lot of room for improvement in $Na_4MnCr(PO_4)_3$-based solid-state batteries," Wang said. "For example, ultra-thin composite solid electrolyte is expected to improve the interface issues and increase the energy density of SSSIBs, and finally to realize the practical applications."

The findings are published in the journal *Energy Material Advances*.

More information: Zhongyue Wang et al, High-Energy $Na_4MnCr(PO_4)_3$@C Cathode for Solid-State Sodium Metal Batteries, *Energy Material Advances* (2023). DOI: 10.34133/energymatadv.0036

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