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BATTERIES & SUPERCAPS
Cover Profile

MXene-Based Anodes for Metal-Ion Batteries

Photograph of Michael Greaves (left), Dr. Suelen Barg (centre), and Dr. Mark A. Bissett (right)

Invited for this month's cover picture is the group of Dr. Suelen Barg and Dr. Mark A. Bissett from the University of Manchester (U.K). The cover picture shows a schematic of how 2D layered materials such as MXenes can be used as anodes for the intercalation of metal ions for use in energy storage applications such as batteries. These novel materials are attracting great interest for energy storage applications and in this Review we summarise the state of the field and future directions. Read the full text of the Review at 10.1002/batt.201900165.

Why the need for a review on MXene based anodes?

MXenes, as one of the most recently discovered 2D materials, are currently the subject of intense research aimed at utilizing them for battery electrodes. A number of reviews have been written about the use of MXenes for energy storage applications, but the field has grown exponentially since the discovery of MXenes in 2011, and it has now become impractical for a single review to critically analyse the full range of literature on the use of MXenes as electrodes in both supercapacitors and batteries. This review summarises the progress made in developing MXene-based batteries, focusing solely on anodes, and highlights the challenges and future direction of the field.

What are the main challenges still outstanding in this broad area of research?

The long-term stability of MXene-based electrodes still requires addressing by the scientific community. Significant steps have been made towards this through chemical functionalisation by attaching different functional groups to the surface, but further work is needed to fully achieve "beyond Li-ion" battery technology.

What was the inspiration for this cover design?

The cover image shows schematically how a variety of different metal cations can be intercalated in between the layers of exfoliated MXene materials. The performance of these anode materials has shown to be further improved through the incorporation of metal oxides or silicon nanoparticles (as pictured).