Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

High-capacity Silicon Anodes

Made with MXene viscous aqueous ink

Overview

This is a new class of conductive binder to fabricate high-capacity Si/2D conductive materials electrodes without any additional polymer or Carbon black.

Traditional polymeric binder is not mechanically robust enough to withstand the stress induced during lithiation/delithiation. This leads to severe disruption of the conduction networks. This results in rapid capacity fade and poor lifetime.

This technology uses MXene inks, titanium carbide (Ti3C2Tx) and carbonitride (Ti3CNTx) as the conductive binder for producing high-capacity nanoscale Si/MXene electrode

Advantages

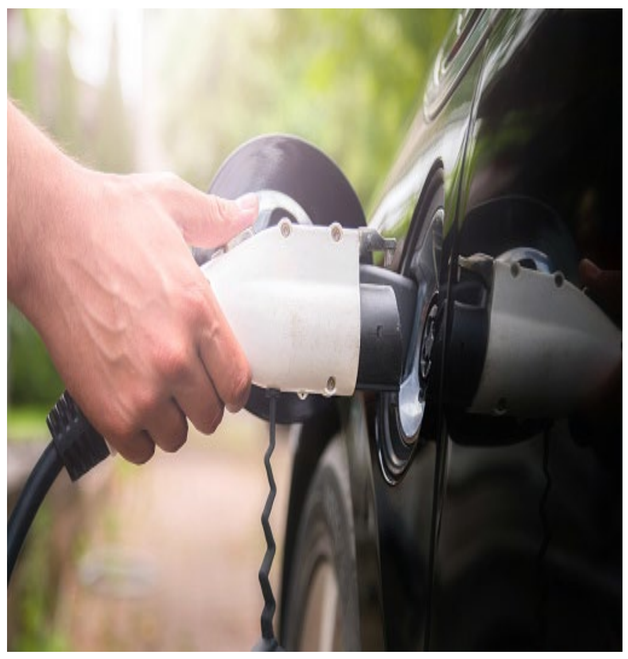
- Radically <u>improve the energy density</u> of Li-ion batteries by replacing the state-of-the-art current electrodes with a novel MXene composite.
- Negates the need for the binder and conductive additives found in today's electrodes.
- Compatible with the existing technologies and processes.
- The estimated energy density in full-cells is : 250 Wh/kg (traditional) vs <u>450 Wh/kg (our MX/Si).</u>

Applications

- Deep cycle and starter batteries
- Can be used in many battery types and shapes
- Adaptable to emergent battery technologies e.g. printed microbatteries

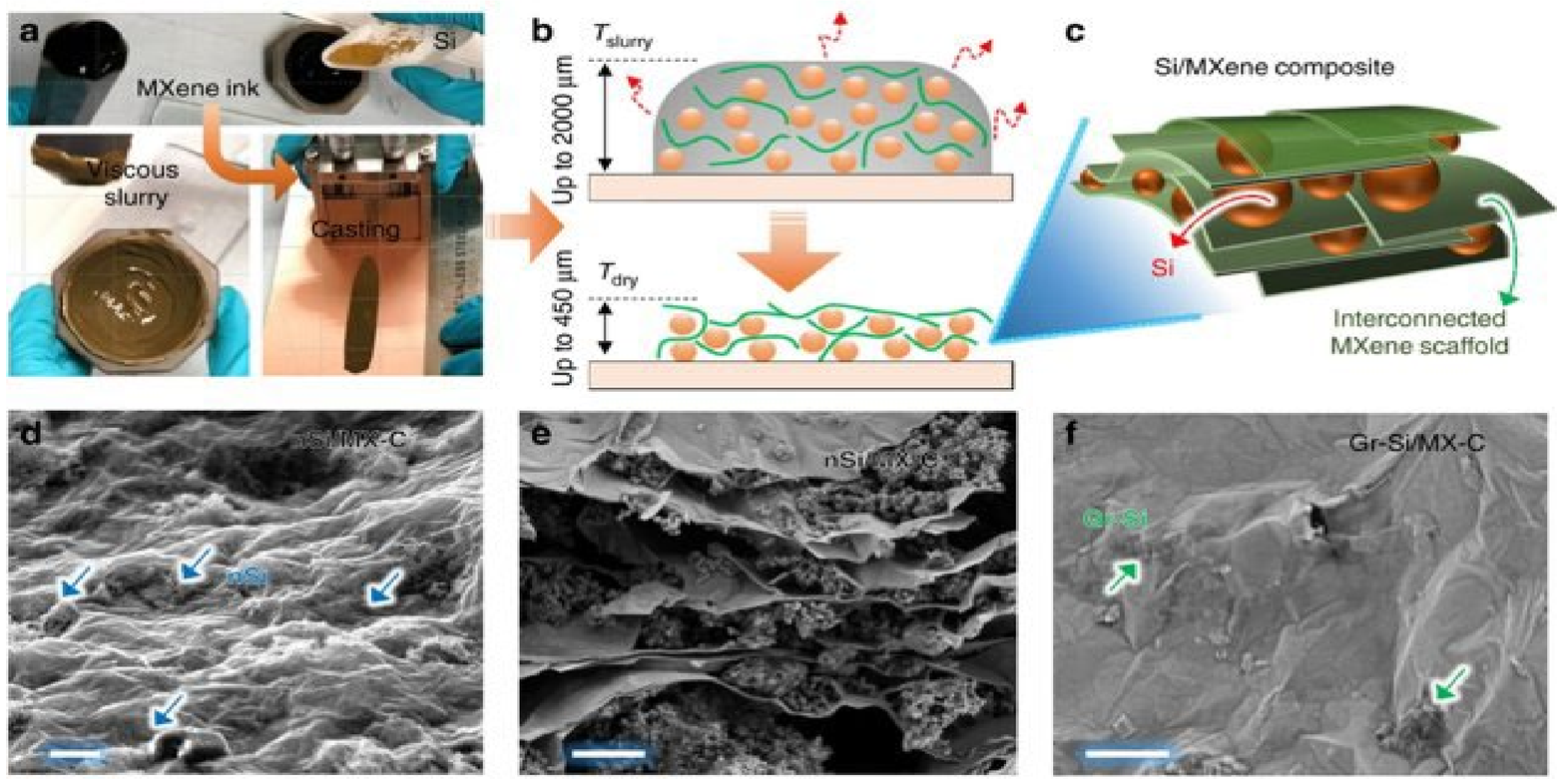
Technology Status

- Research collaboration
- Available to License



Publications

Full characterisation and performance data can be found in this publication: https://www.nature.com/articles/s41467-019-08383-y



Technology Sector
Batteries, electric vehicles, consumer electronics etc.

Patent Details
EPO application in National Phase
WO2020144289A1

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Reference:
VN01-802-01

science foundation ireland
fondúireacht eolaíochta éireann
Ireland's EU Structural Funds Programmes 2007 - 2013
Co-funded by the Irish Government and the European Union
EUROPEAN REGIONAL DEVELOPMENT FUND