

Upcycling plastic waste into high-capacity sodium-battery anodes

This technology upcycles plastic waste into high-performance battery anodes for the next-generation of fast-charging and low-cost sodium-ion batteries (NIBs).

Proposed use

This innovative technology revolutionises the battery industry by directly converting polyethylene terephthalate (PET) plastic waste, including discarded plastic bottles, into high-performance anodes for batteries. This breakthrough has immense potential benefits for battery manufacturers, energy storage companies, and recycling industries, driving the widespread adoption of Na-ion batteries in electric vehicles and renewable energy systems, and promoting a global shift towards a circular economy.

Problem addressed

Despite PET being the most recycled plastic globally, a large percentage of it still ends up in landfills or incineration facilities. Imperial's technology tackles this issue by transforming PET waste into high-performance carbon anodes for batteries. These anodes not only exhibit high energy storage capacity but also support rapid charging capabilities, essential for the next generation of fast-charging, low-cost NIBs. This process significantly reduces raw material costs—using feedstock approximately 100 times cheaper than current precursors—offering a cost-efficient and sustainable solution.

Technology overview

The technology introduces a novel solution that directly converts PET waste into high-quality battery anodes through a unique carbonisation process using tin as a precursor. The created carbon-tin composite anodes can hold a large amount of energy, which allows batteries to charge quickly and hold more power. This innovation is particularly beneficial for producing fast-charging, high-energy-density sodium-ion batteries, offering an effective and sustainable approach to battery manufacturing.

Intellectual property information

GB Priority Application (Number: 2400985.4)

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Benefits

- Low-cost PET waste feedstocks that significantly reduces the cost of anode production.
- Anodes produced are compatible with both lithium-ion and sodium-ion batteries.
- Anodes has fast-charging capabilities, which is suitable to use in sodium-ion batteries.
- Anodes has high energy density. Facilitates the creation of batteries with greater energy storage capacity.
- Provides an eco-friendly alternative to traditional battery production methods.

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Technology reference: 11601