Sustainable lithium batteries

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Lithium-ion batteries offer a contemporary solution to curb greenhouse gas emissions and combat the climate crisis driven by gasoline usage. Consequently, rigorous research is currently underway to improve the performance and sustainability of current lithium-ion batteries or to develop newer battery chemistry.

Lithium-ion batteries could save the planet from petrol-driven cars, but do the batteries themselves live up to their sustainable reputation? Katharine Sanderson investigates efforts to make batteries better

Lithium-ion rechargeable batteries -- already widely used in laptops and smartphones -- will be the beating heart of electric vehicles and much else. They are also needed to...

Nickel-rich layered transition metal oxides are leading cathode candidates for lithium-ion batteries due to their increased capacity, low cost and enhanced environmental sustainability compared...

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Celebrating twenty years

By 2050 up to 1 billion vehicles on the roads will be powered by electricity, around 72 times more than in 2020. The electrified fleet could see an end to gas-guzzlers, smoggy cities and the stench of petrol fumes. These vehicles will be powered by lithium-ion rechargeable batteries.

But lithium-ion batteries have their own sustainability problems. As the demand for electric vehicles balloons in the coming years, a secondary environmental disaster could be on the cards unless the batteries used in those vehicles can be made in a more sustainable way, with consideration given to their full life cycle emists are front and centre of the battery story, from the early work by the scientists who shared the 2019 Nobel prize in chemistry to those around the world now trying to improve on the materials used in them.

Better batteries will need to use less scarce or problematic minerals, or better still none at all. And those they do use will need to be sourced in a sustainable way. A full life-cycle analysis of the components needs to be

considered right at the start of materials development to ensure a supply of batteries into the future, a supply that doesn"t itself ravage the planet.

The main elements that need some serious thought include lithium and cobalt. In May 2021, the International Energy Agency published a report calling on governments to think now about the critical minerals that will be needed to power electric vehicles and sustain renewable energy in future. They highlight the huge increase in mineral demand as we shift from petrol-driven cars to electric ones - with six times more minerals required in an electric car, and the huge increase in their numbers, it doesn"t take a mathematician to work out that a lot more raw material will be required - enough to provide 1.8 million tonnes a year by 2030, according to some estimates.

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