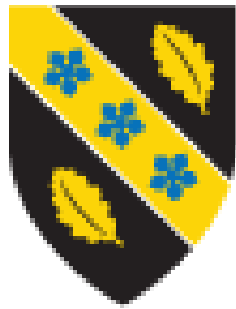


University of Wales Trinity Saint David



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Importance Of Battery Technology Advancements in Electric Vehicles

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Date: November 2023

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1 Introduction

1.1 Aims

To evaluate the need for new and emerging technologies that improve and make available batteries that can be used for electric vehicles.

1.2 Overview and Issues

Electric Vehicles (EVs) have exploded in popularity over the past decade as the world looks for cleaner alternatives to traditional hydrocarbon fuelled vehicles. By 2030, as many as 125 million EVs will be in use according to projections using current and expected data on supplies and demand (Tytgat, 2014). Results have shown that provided the electricity used to charge the vehicle is not produced by green-house gas producing methods such as coal, that EVs are less negatively impactful on the atmosphere (Hawkins, Gausen and Strømman, 2012).

However, a frequently shown issue is the availability of materials needed to make the Lithium-Ion batteries that the vehicles use at a scale large enough to accommodate the previously shown demand. (Råde and Andersson, 2001; Yaksic and Tilton, 2009; Kushnir and Sandén, 2012; Speirs *et al.*, 2014). To meet decarbonisation targets, the mining sector would have to expand and there has been some doubt as to its ability to do so in time (Speirs *et al.*, 2014).

2 Possible solution

2.1 Lowering Demand

As previously stated, one of the main issues with EVs is the supply of Lithium needed. This is due to the difficult process of extracting it from the ground – not as simple as mining other, less reactive metals such as iron (Jascha Forster, 2011).

To balance the somewhat limited supply of lithium with the growing demand for new Li-ion batteries, alternative metals with similar properties could be used either in place of or as an alternative to lithium if it is possible. (Kim *et al.*, 2012) have stated that the interest in batteries using sodium instead of lithium could be a solution to the rising cost and scarcity of lithium.

These Na-ion batteries have been shown to be safer, less expensive although less energy dense than their lithium counterparts (Kubota and Komaba, 2015). This means that they could be used in situations where the energy capacity of a lithium battery is unnecessary for the application and a cheaper alternative would suffice.

These Na-ion batteries would help to lower the demand for lithium as manufacturing things that had previously required it would no longer – freeing up more lithium to be used in places where its high energy density was required – such as the batteries of EVs.

The below figure shows the resurgence of interest in this technology within recent years by the number of scientific papers published with the goal of improving and understanding the technology or those that surround it (Kubota and Komaba, 2015).

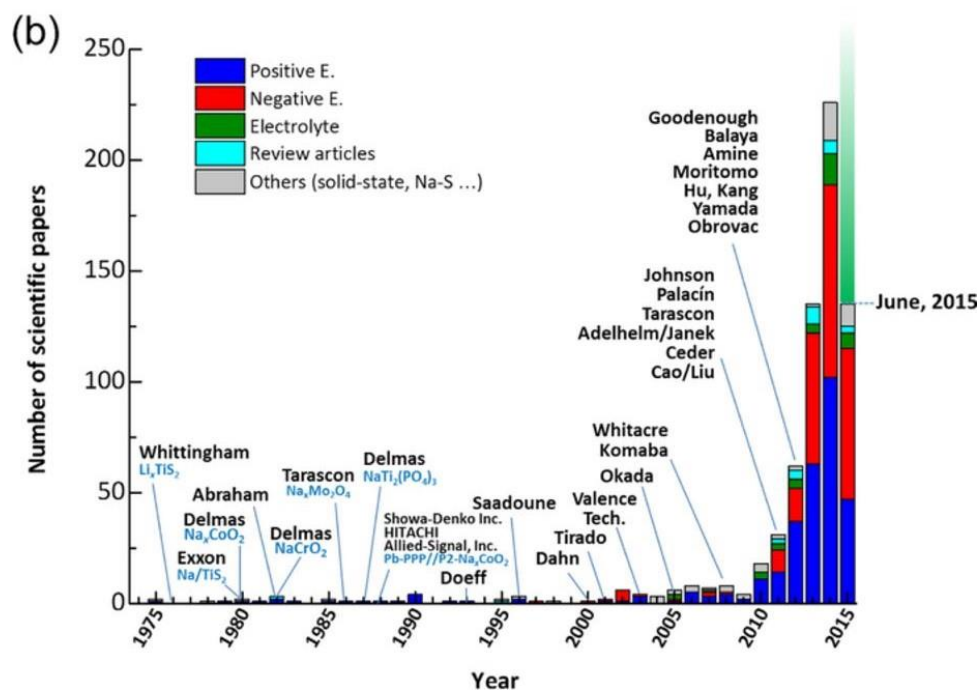


Figure 1 – Interest in Na-ion (Kubota and Komaba, 2015)

3 Conclusion

In conclusion, Electric Vehicles are an inevitable part of the near future as petrol and diesel engines are phased out of consumer and industrial vehicles in exchange for electric motors and batteries (Tytgat, 2014).

There are issues with the supply of lithium to be used in these batteries, but they can be alleviated with new research into alternatives such as sodium-ion batteries (Kubota and Komaba, 2015).

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