

**EPSRC CASE studentship**

**Water dispersible binders for rapid cathode manufacture and efficient recycling**

Supervisors: Prof Andy Abbott and Prof Karl Ryder

**About the project**

The electrification of transportation is a major technological goal over the next 10 years but the proliferation of lithium-ion batteries had an inherent need to develop cells which can be readily recycled with a high degree of elemental retention and purity. To this end, design for recycle is a critical element in the development of sustainable batteries. Recent work has highlighted the importance of polymeric binders in elemental circularity [1]. While some advances have been made using non-fluorinated binders for anode manufacture the major challenge is to produce novel cathode binders which can be applied and removed using environmentally compatible methods. This EPSRC project, in collaboration with a major automotive OEM, will develop novel binders from sustainable sources which can be applied from aqueous solvents. The project will develop and characterise novel binders and use them to make and test lithium-ion batteries. The project will also carry out technoeconomic and life-cycle analysis on the novel binders and benchmark the data against current best available technology. There will be an opportunity to carry out placement studies with the CASE sponsor.

**Entry requirements**

Applications are sought from talented and motivated UK candidates with an academic background in chemistry or material science. Experience of batteries would be an advantage but is not essential.

Applicants must hold:

1st or 2:1 Honours degree (or equivalent), and Masters degree with Distinction (or equivalent).

For queries regarding the project, please email Andy Abbott directly (apa1@le.ac.uk)

The 4-year studentship, commencing in September 2023, will cover full tuition fees and a stipend equivalent to UKRI rates (£17,668 tax free in 2022/23), plus an industrial top-up stipend from sponsor, subject to contract. It also provides travel support for training, conferences and annual visits to the sponsor.

[1] D. L. Thompson, J. M. Hartley, S. Lambert, M. Shiref, G. D. J. Harper, E. Kendrick, P. Anderson, K. S. Ryder, L. Gaines and A. P. Abbott, The Importance of Design in Lithium-Ion Battery Recycling – A Critical Review, *Green Chem.*, 2020, 22, 7585 – 7603