THE UNIVERSITY of EDINBURGH
School of Chemistry

Thermochemical materials for thermal management applications

A PhD studentship is available in the groups of Professor Caroline Kirk and Professor Colin Pulham University of Edinburgh; School of Chemistry, joint with Dr Rebecca Ravotti and Professor Anastasia Stamatiou who lead a research group within the Competence Centre Thermal Energy Storage, based at Lucerne University of Applied Sciences and Arts (HSLU).

The studentship is fully funded for 42 months, co-funded by the University of Edinburgh and HSLU and covers tuition fees and an annual stipend at the UKRI rate, for 2024-25 this is £19,237 per annum, for a candidate satisfying EPSRC residency criteria, see https://www.ukri.org/councils/esrc/career-and-skills-development/funding-for-postgraduate-training/eligibility-for-studentship-funding/#contents-list

Project Summary

Thermal management is used to reduce the amount of excess heat generated in various processes and systems to protect and cool critical components, for instance batteries or electronics. For instance, overheating and thermal runaway is a huge issue with lithium-ion batteries (LIB) and can result in fires.

Phase Change Materials (PCMs) can be used to store and release heat during chemical processes, for instance, salt hydrates can dehydrate on heating and rehydrate on cooling. PCMs have applications as energy storage materials, but have wider uses in the thermal management of systems.
This project will study a range of salt hydrate materials, which dehydrate in the temperature range 60-150 °C and have potential for use in various thermal management applications, such as in battery management systems and fire protection.

In the first instance, the initial application of cover letter and CV should be directed to:
Caroline Kirk, School of Chemistry, University of Edinburgh, David Brewster Road, Edinburgh EH9 3FJ, UK. Email: Caroline.Kirk@ed.ac.uk

The position will remain open until filled. A closing date may be added at a later date.

References

Salt hydrate phase change materials: Current state of art and the road ahead, Prakhar Dixit, Vennapusa Jagadeeswara Reddy,Sumit Parvate, Apoorv Balwani, Jitendra Singh, Tushar Kanti Maiti, Aravind Dasari, Sujay Chattopadhyay; https://doi.org/10.1016/j.est.2022.104360

Passive cooling of Li-Ion cells with direct-metal-laser-sintered aluminium heat exchangers filled with phase change materials, S. Landini, R. Waser, A. Stamatiou, R. Ravotti, J. Worlitschek, T.S. O'Donovan; https://doi.org/10.1016/j.applthermaleng.2020.115238

Crystallisation studies of sodium acetate trihydrate – suppression of incongruent melting and sub-cooling to produce a reliable, high-performance phase-change material, David E. Oliver, Andrew J. Bissell, Xiaojiao Liu, Chiu C. Tang, Colin R. Pulham; https://doi.org/10.1039/D0CE01454K