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Applications of carbon-based nanomaterials as electrode catalysts for redox flow batteries (RFBs)

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Several positive electrodes were employed in the hydrogen/manganese hybrid redox flow battery (regenerative fuel cell). This was a follow-on work from a similar investigation on a hydrogen/vanadium RFB. Graphite felt showed a better performance and thus this was used in combination with carbon metal fabrics (prepared by means of electrospinning) to improve the performance even further. High energy efficiencies more than 84% were noted at 100 mA cm–2 along with relatively high peak power densities around 0.6 W cm–2 (for gas-liquid based hybrid RFBs only). In addition, 100 charge/discharge cycles were successfully performed at the same current density with electrolyte capacities above 20 Wh L–1. Therefore, this combination of electrodes warrants further investigations in future to optimize the H/Mn system for potential commercial exploitation. It is worth noting that biomass-derived carbon electrodes can also be prepared via electrospinning, as discussed in our current work, and could be of exceptional value for RFBs in the future.

Biography:

Barun Chakrabarti completed his MEng in Chemical Engineering at Imperial College London (ICL) and a PhD on Redox Flow Batteries (RFBs) at the University of Manchester, UK. After a year in industry, he moved to Malaysia as a Senior Lecturer. There he executed projects on applying ionic liquid electrolytes for RFBs. Then he worked at ICL, before moving to WMG and finally to SUNUM. He is experienced in electrochemical technologies for green energy applications. His current research focuses on electrophoretic deposition of nanomaterials for energy storage. He has over 60 journal publications including a couple in Wiley.