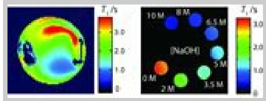
Watching Battery Chemistry using Magnetic Resonance Imaging

Posted on Wednesday 11th September 2013



Magnetic resonance relaxation maps visualising zinc-oxygen electrochemistry in a Zn-air battery (left) and a range of sodium hydroxide solutions (right).

Research at Birmingham University, lead by **Dr Melanie Britton (/staff/profiles/chemistry/britton-melanie.aspx)** (Chemistry) with **Dr Alison Davenport (/staff/profiles/metallurgy/davenport-alison.aspx)** (Metallurgy and Materials), has been recently highlighted by the American Chemical Society weekly news magazine ***Chemical and Engineering News* (http://cen.acs.org/articles/91/web/2013/09/Watching-Battery-Chemistry-MRI.html)**, following publication of their paper in ***Journal of Physical Chemistry Letters* (http://pubs.acs.org/doi/abs/10.1021/jz401415a)**.

In their recent paper, they employed magnetic resonance imaging (MRI) to visualise the zinc-oxygen electrochemistry inside a model Zn-air battery. MRI, a technique typically associated with medical diagnosis and research, is able to map the spatial distribution of molecules and ions containing MR active nuclei (e.g. 1H). While MRI has enormous potential for in situ investigation of the composition and molecular transport in a battery, there are currently very few examples of MRI being used to probe such systems. This is largely due to the experimental challenges associated with image distortions caused by the metals typically found in batteries. In their recent work, Britton and Davenport show, not only, that these artefacts can be minimised through careful orientation of the metal in the cell, but that the chemical composition and molecular transport of species can be mapped during battery operation. Such experiments are expected to be important in the development of new batteries, as well as other electrochemical technologies.