

Postdoctoral Research Associate in Electrochemical Studies for an Aluminum Battery

Chemical Sciences Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee

ORNL10-22-CSD

Project Description:

The Chemical Sciences Division at Oak Ridge National Laboratory is seeking a post-doctoral associate to conduct fundamental electrochemical studies of aluminum deposition and dissolution in imidazolium chloride ionic liquid electrolyte related to development of an aluminum ion battery or an aluminum air battery. Determination of the morphology of the aluminum surface as a function of cyclic dissolution-deposition is involved as well.

Electrical energy storage based on batteries made from novel materials that would increase the level of energy storage per unit volume and weight while maintaining stable electrode-electrolyte interfaces are needed. The use of the aluminum - aluminum(III) redox couple that could accept more than one electron, without a large change in cell voltage as the additional electrons are added, has the potential to increase significantly the energy density of a cell. The research will involve electrochemical studies of aluminum in an ionic liquid electrolyte containing excess AlCl_3 so that the mobile aluminum species is the AlCl_4^- ion. These solutions are air and moisture sensitive and require that electrochemical measurements be conducted in a glove box or using an electrochemical cell adapted or use on a vacuum line. The successful candidate will measure the Al(III) and Cl^- concentration dependence of reversible Al deposition/dissolution. Voltammetry will be used to determine electrochemical kinetics. Electron microscopy will be used to determine the surface structure and morphology of the Al deposit as electrolyte composition varies and as a function of the extent of reaction and numbers of cycles.

Qualifications:

Candidates must have a PhD in physical or analytical chemistry, chemical engineering, material science, or a closely related field. This position requires a strong experimentalist with demonstrated experience in electrochemistry or battery research including prior experience with ionic liquid electrolytes in an air and moisture sensitive environment. Prior experience with *in situ* spectroscopy-electrochemistry will be an advantage. The candidate should be a self-starter, able to work independently and able to participate creatively in refining program directions. Presentations at national meetings and publication of scientific results in peer-reviewed journals are expected. The candidate must have good oral and written communication skills in English, and be able to interact effectively with a broad range of colleagues. Applicants cannot have received the most recent degree more than five years prior to the date of application appointment and must complete all degree requirements before starting their appointment.

Technical Questions:

Questions regarding the position can be directed to Gilbert Brown at browngm1@ornl.gov. Please include the requisition number and title when corresponding.

How to Apply:

Qualified applicants must apply online at https://www2.ornl.gov/ORNL_POST/. All applicants will need to register before they can begin the online application. For complete instructions, on how to apply, please see the instructions at <http://www.ornl.gov/orise/edu/ornl/ornl-pdpm/application.htm>.

This appointment is offered through the ORNL Postgraduate Research Participation Program and is administered by the Oak Ridge Institute for Science and Education (ORISE). The program is open to all qualified U.S. and non-U.S. citizens without regard to race, color, age, religion, sex, national origin, physical or mental disability, or status as a Vietnam-era veteran or disabled veteran.