

Lugar Center for Renewable Energy, Alkaline Anion Exchange Membrane Fuel Cells

School of Engineering and Technology
Indiana University – Purdue University Indianapolis
Rongrong Chen

Abstract

The U.S. Army needs new reliable, long lasting, and lightweight power sources suitable for its future soldiers. A new technology, alkaline anion exchange membrane fuel cells (AAEMFCs) developed by the researchers at the Richard G. Lugar Center for Renewable Energy, has the potential to be an advanced power source for combat applications. AAEMFCs have several advantages over current existing proton exchange membrane (PEM) fuel cells, e.g. non-Pt catalysts with good methanol/ethanol tolerance can be used in the cathodes of the AAEMFCs. Concentrated liquid fuels, such as methanol, ethanol, or ethylene glycol, can be used in the AAEMFCs and have the potential of producing higher power capacity and better durability than the direct alcohol fuel cells based on PEMs. However, several technical barriers need to be overcome for applying this technology for future soldiers. The objective of our research effort is to investigate solutions to these technical challenges, which include developing novel AAEMs with ionic conductivity comparable to the PEMs; novel non-Pt catalysts for anode and cathode and ionomers for electrochemical interfaces of electrodes.