



Department of Materials Science and Engineering Seminar Series 2024

High Performance of Ionic Liquid-based Thermoelectric Materials Enhanced with Porous or Electronic Components

Qian Qi

Date and time: 13th December 2024 (Friday) 3:30PM - 5:30PM

Venue: EA-06-02

Abstract

Efficiently harvesting waste heat is crucial for sustainable development because of the abundant waste heat on earth. Recently, ionic thermoelectric (TE) materials, such as ionic liquids (ILs) and ionogels, emerged as the next-generation TE materials mainly due to their high thermopower, higher than that of the electronic counterparts by 2-3 orders in magnitude. It is of great significance to improve the ionic TE properties and develop novel devices using ionic TE materials. Here, I will present my work to improve the TE properties of EMIM:DCA (an ionic liquid) by incorporating ZIF-8 that is a MOF. This can greatly enhance the thermopower from 8.8 to 31.9 mV·K⁻¹ at room temperature. Additionally, to overcome the problem of harvesting only intermittent heat by ionic TE materials, I developed a mixed ion-electron TE generator (MTEG). The active material is an ionogel blended with reduced graphene oxide (rGO), and it is a mixed ion-electron conductor. The MTEGs can harvest both intermittent and steady heats, and its thermopower under steady temperature gradient is higher than the conventional TEGs by 1-2 orders in magnitude.

Biography

Mr. Qian Qi received his B.Eng. and M.Eng. degrees from the Central South University and is currently pursuing his Ph.D. under the supervision of Prof. Ouyang Jianyong. His research focuses on developing high-performance ionic thermoelectric materials and devices.

Please join us!

HOST: Prof Ding Jun