Contribution ID : **207** Type : **Oral**

Materials And Interfacial Design For Advanced Potassium Ion Storage

Friday, 20 November 2020 10:30 (20)

Developing new renewable energy storage devices is vital for regulating the energy output of intermittent solar and wind energy, which have been expected to occupy increasing proportions of energy sources in light of the environmental issues caused by fossil fuel energy. Amid staggering advances on grid-scale devices and electric vehicles, there has been great interest in exploring potassium ion batteries (PIBs). The motivations triggering the study of PIBs relate to the benefits of their relatively high energy density resulting from the low standard redox potential of potassium (-2.93 V vs. E0), which is close to that of lithium (-3.04 V vs. E0), their low cost, which is ascribed to the abundance of potassium (1.5 wt. %) in the Earth's crust), and also their fast ion transport kinetics in electrolyte. In terms of electrode materials, alloy-based materials have been considered as good candidates for high-energy-density devices due to their relatively high theoretical capacity. However, the huge volume variations and sluggish ionic diffusion hinder their cycle life and fast charge/discharge capability. Through the optimization of materials processing, the introduction of carbon matrix and the selection of electrolytes, the high-energy-density and long cycle life alloy-based anodes have been obtained. In addition, to further increase the energy density, we successfully fabricate the K-CO2 batteries by employing three-dimensional carbon-based metal-free electrocatalysts. We hope the relevant work will promote the developments of K ion chemistry in energy storage fields.

Primary author(s) : ZHANG, Wenchao (University of Wollongong)

Presenter(s) : ZHANG, Wenchao (University of Wollongong)

Session Classification : Session 11 - Advanced Materials and Hard Matter

Track Classification : Advanced Materials and Hard Matter