Harnessing Superoxide Chemistry, Carbon Electrodes, and Solid-State Electrolytes for K-O_2 Batteries

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Abstract: The heavy reliance of lithium-ion batteries (LIBs) has caused rising concerns on the sustainability of lithium and transition metals (TM). Developing alternative energy storage technologies beyond lithium has become a prominent slice of global energy research portfolio. This presentation will discuss the advantages of potassium-based batteries, particularly the K-O_2 battery, as well as the challenges associated with their development. Furthermore, our recent progress in carbon electrodes and potassium superionic conductors will be discussed, which will be crucial in solving challenges in potassium batteries.

Biosketch: Yiying Wu received his B.S. in chemical physics from the University of Science and Technology of China in 1998, and his Ph.D. in chemistry from the University of California at Berkeley in 2003 with Prof. Peidong Yang. He then did his postdoctoral research with Prof. Galen D. Stucky at the University of California, Santa Barbara, and joined the chemistry faculty at The Ohio State University in the summer of 2005. He was promoted to associate professor with tenure in 2011 and to full professor in 2014. From 2017 to 2022, he was appointed as the Leet Endowed Chair. He has been serving as an associate editor for ACS Applied Materials and Interfaces since 2013. His group focuses on materials chemistry and interface synthesis for energy conversion and storage. He is the inventor of the one-electron K-O_2 battery and pioneered solar batteries that integrate solar harvesting with energy storage. He received Cottrell Scholar Award in 2008, NSF CAREER Award in 2010, CAPA Biomatik Distinguished Faculty Award in 2014, Franklin County Commissioner's Award in 2014, *Midwest Energy News* "40 under 40" in 2015, *Nano Research* Top Paper Award in 2019, and ACS Akron Award in 2019. His invention of K-air battery received DOE Clean Energy Prize in 2014.