

SEMINAR

K-batteries and Li-S batteries

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What comes after conventional lithium-ion batteries? Among the emerging electrochemical energy storage technologies, potassium-ion and lithium–sulfur batteries offer two fascinating, yet fundamentally different, pathways toward the next generation of sustainable and high-performance devices. This lecture will take participants beyond established battery chemistries, exploring the scientific principles, materials opportunities, and technological bottlenecks of these promising systems. For potassium-ion batteries, we will investigate the advantages of potassium chemistry, novel electrode materials, electrolyte engineering, and the critical challenges associated with ion transport, interfacial stability, and long-term cycling. For lithium–sulfur batteries, attention will turn to their extraordinary theoretical energy density, complex sulfur conversion chemistry, polysulfide shuttle, and lithium-metal anode limitations. By connecting fundamental electrochemistry with cutting-edge materials science, we will examine how innovative material architectures, interface design, and advanced characterization can unlock new possibilities. Are these technologies destined to remain laboratory breakthroughs, or can they become credible alternatives in tomorrow's battery market?