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## Construction of iron sulfide-carbon interconnected graphene nanocomposites for superior lithium & sodium-ion storage

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The increasing demand for electrical energy storage stimulates development of the secondary battery technology. Transition metal sulfides (TMSs) represent one class of the most promising anode materials for lithium & sodium-ion storage, due to the large theoretical capacity ( $> 400 \text{ mA h g}^{-1}$ ) and ease of scale-up production. The intrinsic shortcomings in  $\text{Fe}_x\text{S}_y$  electrodes, including low electrical conductivity, serious volume expansion and sluggish ion diffusion kinetics during cycles, can be overcome by rational structural and compositional design to achieve high-performance lithium & sodium-ion storage. Herein, the design and nanoengineering of carbon film coated iron sulphide nanorods ( $\text{C@Fe}_7\text{S}_8$ ) are as an advanced lithium-ion storage material. This composite material has exhibited high lithium-ion storage capacity at  $1148 \text{ mA h g}^{-1}$  under the current rate of  $500 \text{ mA g}^{-1}$  for 170 cycles and an impressive rate-retention capability at  $657 \text{ mA h g}^{-1}$  with a current density of  $2000 \text{ mA g}^{-1}$ . Moreover, Three-dimensional (3D) carbon-wrapped iron sulfide interlocked graphene ( $\text{Fe}_7\text{S}_8\text{@C-G}$ ) composites for high-performance sodium-ion storage are designed and produced through electrostatic interaction and subsequent sulfurization. As a sodium-ion storage material, the  $\text{Fe}_7\text{S}_8\text{@C-G}$  composites exhibit a reversible capacity of  $449 \text{ mA h g}^{-1}$  at  $500 \text{ mA g}^{-1}$  after 150 cycles and a retention capacity of  $306 \text{ mA h g}^{-1}$  under a current density of  $2000 \text{ mA g}^{-1}$ . These results demonstrate that superior lithium & sodium-ion storage properties are mainly attributed to the unique designed nanostructural construction.

### Biography

Mr. Wei Huang completed his Master degree from SDU & Rice Joint Center for Carbon Nanomaterials, Shandong University (SDU), P. R. China in 2017. He is a PhD student of Technical University of Denmark, Denmark. He is a member of International Society of Electrochemistry.