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Metal Selenide-Carbon Nanofiber Composites for Battery Anodes

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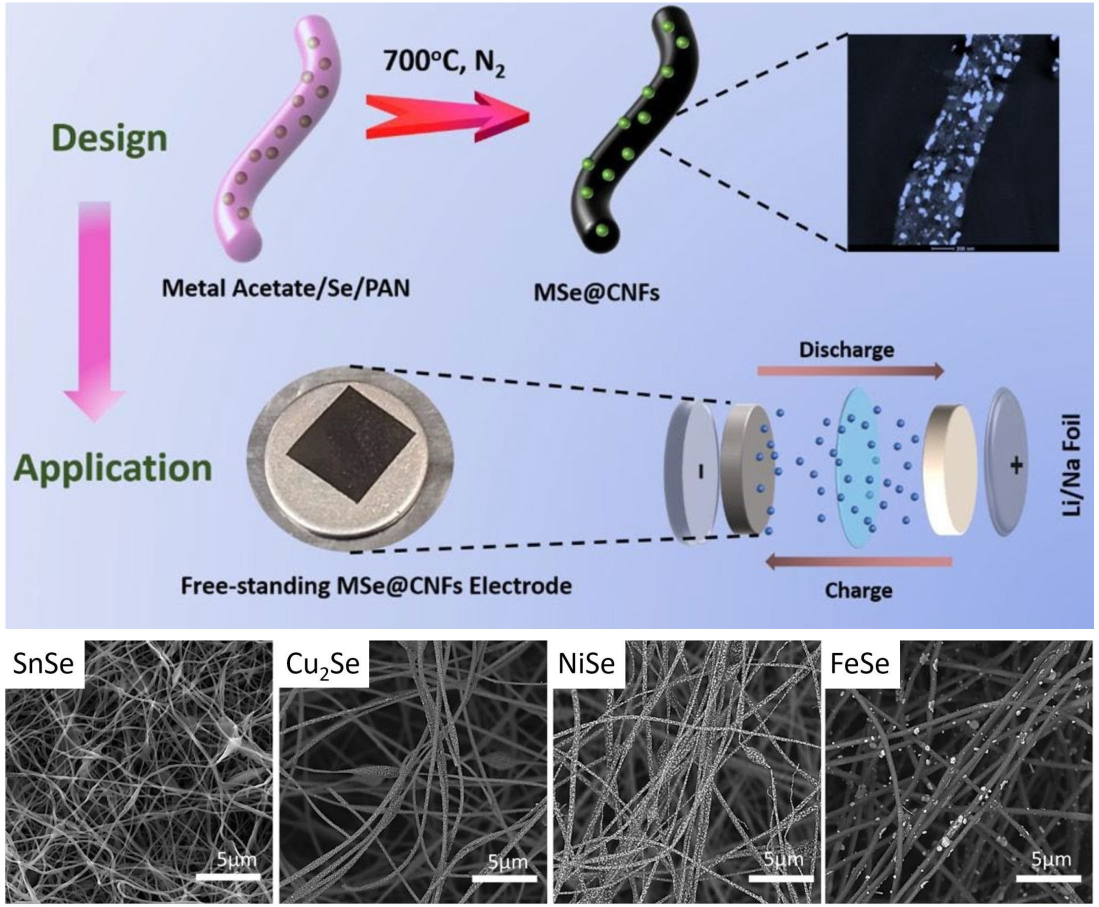
The ever-growing demand for electric vehicles and portable electronic devices continues to drive the craving for lightweight, high-energy-density, and long-lifespan batteries. Currently used lithium-ion batteries are limited by the capacity of the electrode and the scarcity of resources (lithium). The search for next-generation materials not only seeks to replace lithium with sodium but to provide suitable anode materials. Metal selenides (MSe, M = Sn, Fe, Ni, Cu) offer the desired conductivity, stability, cost-effectiveness, and higher theoretical capacity compared to commercial graphite.

Combining metal selenide nanoparticles with carbon nanofibers to form a free-standing network enables fast electrolyte penetration, accommodation of volume changes, and electron transport along the fibers. Electrospinning offers a unique single-step approach to produce anodes reliably and reduces weight and contamination from otherwise needed additives. Device performance and cycle stability were investigated.

The morphology and structure of the formed composite materials were analyzed using PARADIM's electron microscopy suite.



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