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# Recessed Deposition of TiN into N-doped Carbon as a Cathode Host for Superior Li-S Batteries Performance

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## Abstract

In this work, we put forward a novel cathode host for Li-S batteries by loading titanium nitride (TiN) nanoparticles into the pores of N-doped carbon as a proof-of-concept. The selection of TiN arises from its strong binding ability with polysulfide and its exceptionally high conductivity of  $5 \times 10^6$  S/m. As for N-doped porous carbon, it provides necessary physical adsorption and extra chemical adsorption sites from the N-doping. Besides the above advantages, the most substantial merit endowed to this structure is the pore-loaded TiN design. The carbon pore size confines the TiN precursors to the nanoscale and prevents otherwise subsequent agglomeration of TiN nanoparticles. Moreover, the pore-loaded TiN design, with fully exposed adsorptive surface and highly dispersed adsorptive sites, guards against the blocking of future sulfur infiltration and  $\text{Li}^+$  diffusion. The advantages of the TiN

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