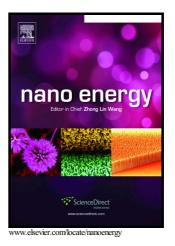
### Author's Accepted Manuscript

On The Mechanistic Role of Nitrogen-Doped Carbon Cathodes in Lithium-Sulfur Batteries with Low Electrolyte Weight Portion

Susanne Doerfler, Patrick Strubel, Tony Jaumann, Erik Troschke, Felix Hippauf, Christian Kensy, Alexander Schökel, Holger Althues, Lars Giebeler, Steffen Oswald, Stefan Kaskel



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#### **ACCEPTED MANUSCRIPT**

#### On The Mechanistic Role of Nitrogen-Doped Carbon Cathodes in Lithium-Sulfur Batteries with Low Electrolyte Weight Portion

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Declarations of interest: none

#### Abstract

The lithium-sulfur (Li–S) battery is a promising alternative to overcome capacity and specific energy limitations of common lithium-ion batteries. Highly porous, nitrogen-doped carbons as conductive host structures for sulfur/lithium sulfide deposition are shown herein to play a critical role in reversible cycling at low electrolyte/sulfur ratio. The pore geometry is precisely controlled by an efficient, scalable ZnO hard templating process. By using an electrolyte volume as low as 4  $\mu$ l mg<sup>-1</sup><sub>S</sub>, the beneficial nitrogen functionality leads to a twofold increased cell lifetime turning our findings highly favorable for real applications. Stable cycling of up to 156 cycles (59 cycles with undoped carbon) with high sulfur loadings of 3 mg cm<sup>-2</sup> is achieved. *Operando* X-ray diffraction measurements during cycling show the transformation pathway of the sulfur – polysulfide – Li<sub>2</sub>S species. The observed intermediates critically depend on the nitrogen doping in the cathode carbon matrix. Nitrogen-doped carbons Download English Version:

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