

Author's Accepted Manuscript

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PII: S2211-2855(17)30061-7
DOI: <http://dx.doi.org/10.1016/j.nanoen.2017.01.054>
Reference: NANOEN1768

To appear in: *Nano Energy*

Received date: 20 December 2016
Revised date: 23 January 2017
Accepted date: 27 January 2017

Cite this article as: Theresia Göhlert, Pablo F. Siles, Tom Päßler, Robert Sommer, Stefan Baunack, Steffen Oswald and Oliver G. Schmidt, Ultra-Thin All-Solid-State Micro-Supercapacitors with Exceptional Performance and Device Flexibility, *Nano Energy*, <http://dx.doi.org/10.1016/j.nanoen.2017.01.054>

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Ultra-Thin All-Solid-State Micro-Supercapacitors with Exceptional Performance and Device Flexibility

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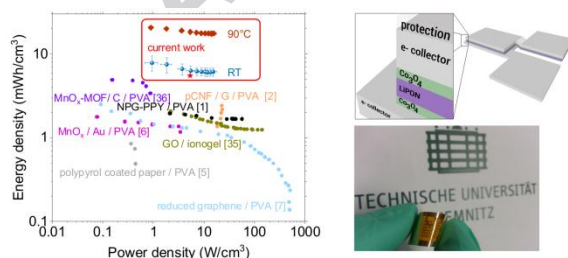
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Abstract:

Relying on the combination of lithium phosphorous oxynitride (LiPON) as electrolyte and cobalt oxide (Co_3O_4) as electrode material it is possible to fabricate symmetric all-solid-state micro-supercapacitors (ASTSCaps) on rigid and flexible substrates. Due to the nanoscale active layer dimensions, the excellent performance of the component materials and the high nominal voltage of 2 V, an exceptionally high volumetric energy and power densities of up to 8 (± 2) mWh/cm^3 and 16 (± 2) W/cm^3 , respectively, are obtained. These results are going far beyond the current state-of-the-art performance limits. The ASTSCaps are temperature stable up to 215 °C (for 1 V nominal voltage) and experience an endurance of more than 30000 cycles. These ultra-thin all-solid-state micro-supercapacitors bring strong benefits for on-chip energy storage and open up interesting new avenues for autonomous and flexible electronic microsystems.

Graphical abstract



Keywords: supercapacitor; flexible electronics; all-solid-state; cobalt oxide; LiPON

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