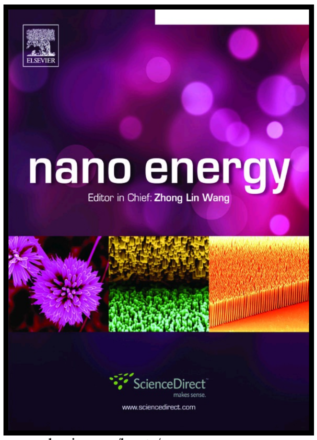

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Laser-processed graphene based micro-supercapacitors for ultrathin, rollable, compact and designable energy storage components

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Abstract: With the development of wearable/flexible electronics, a formidable challenge is to integrate electronic components which were large in their original size into a flexible, thin, and arbitrary layout. As an indispensible component in electronics, commercial micro-supercapacitors are disadvantageous in their clumsy cuboid geometry and limited capacity, and are not promising for future applications. In comparison, film-like micro-supercapacitors are superior in miniaturized system integration since they can be folded to fit in restricted spaces while maintaining a high level of volumetric energy density. Here, we carried out a benchmark study of a state-of-the-art well-packaged thin film micro-supercapacitor toward commercial micro-supercapacitor and aluminum electrolyte capacitor. The micro-planar supercapacitor not only exhibits 3.75 times of a commercial micro-supercapacitor and 8,785 times of an aluminum electrolytic capacitor in volumetric energy density under 1,000 mV s^{-1} scan rate, but can also be tailored into diversified shapes, rolled up, and plugged into tiny interstitial spaces inside a device. Such ultrathin (18 μm) micro-supercapacitor component with high volumetric energy density (0.98 mWh cm^{-3} in LiCl-PVA gel, 5.7 mWh cm^{-3} in ionic liquid), can be integrated into an electronic device system and shows a series of superior performance characteristics over current commercial benchmarks, which may find vast applications.