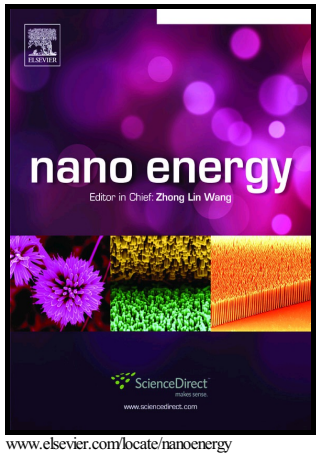

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Screen-printable microscale hybrid device based on MXene and layered double hydroxide electrodes for powering force sensors

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Abstract

Coplanar energy storage devices with interdigitated electrodes have attracted a significant amount of attention as micropower units for portable and flexible electronics, and self-powered systems. Herein, we propose a simple, cost-effective, and scalable two-step screen-printing process to fabricate flexible coplanar asymmetric microscale hybrid device (MHD) with a higher energy density compared to carbon-based microsupercapacitors. 2D titanium carbide MXene ($Ti_3C_2T_x$) with a large inlayer spacing is selected as negative electrode, and Co-Al layered double hydroxide (LDH) nanosheets are selected as positive electrode. The assembled coplanar, all-solid-state, asymmetric MHD possesses a higher energy density (8.84 μWh cm^{-2}) compared to the MXene-based, coplanar, symmetric microsupercapacitors (3.38 μWh cm^{-2}), and exhibit excellent flexibility and reliability, as well as cycling stability (92% retention of the initial capacitance after 10,000 cycles). Moreover, we