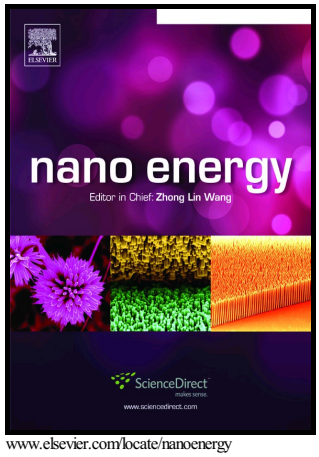

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Abstract

The global availability of sodium and a possibility to avoid the use of copper current collectors make electrochemical sodium-ion storage attractive for battery and metal-ion capacitor applications. However, the use of Na instead of Li ions requires different electrode materials that can accommodate larger Na ions and still provide high charging rate and high volumetric capacity. Herein we report on the fabrication of porous Ti_3C_2 MXene/CNT composite paper electrodes for sodium-based energy storage devices. The heterostructure formation was realized by electrostatic attraction between negatively charged 2D MXene nanosheets and positively charged 1D CNTs. This method efficiently prevented restacking of MXene nanosheets and produced a well-defined porous structure, thereby facilitating electrolyte transport and access of ions to the electrode and producing functional MXene-based electrodes for sodium-ion storage. When applied as freestanding electrodes for sodium-ion storage, the built-to-order Ti_3C_2 MXene/CNTs porous films showed high volumetric capacity of 421 mA h cm^{-3} at 20 mA g^{-1}, good rate performances,