Abstract

Porous and highly flexible OMS-2 membranes have successfully been obtained via side-by-side and end-to-end alignment of the short OMS-2 nanorods into 1D microyarn superarchitectures and interweaving the resultant microyarn superarchitectures under ambient pressure. The side-by-side and end-to-end alignment of the short OMS-2 nanorods into 1D microyarn superarchitectures is effected by the use of cheap, abundant, and bioavailable cellulose linters as a sacrificial template that is completely digested within the course of the reaction and thus no post-synthesis treatment to remove it is required. The as-prepared OMS-2 membrane, without the use of conductive carbon, shows specific capacitance of 104 F/g at current density of 0.5 A/g and excellent electrochemical cycling. Scanning and transmission electron microscopy reveals the remarkable alignment of the short nanorods into microyarn superarchitectures and interweaving of the microyarns. In addition, transmission electron microscopy shows that the primary building blocks, the nanorods, are singly crystalline while cross-sectional imaging by tomography shows stratified and porous internal structure of the membrane.