Supporting Information

Natural Cellulose Fiber as Substrate for Supercapacitor

Zhe Gui,[¶,§] Hongli Zhu,[£,§] Eleanor Gillette,[¶] Xiaogang Han,[£] Gary W. Rubloff,[£,*] Liangbing Hu,[£,*] and Sang Bok Lee,[¶,‡,*]

[¶]Department of Chemistry and Biochemistry, University of Maryland, College Park, Maryland 20742, United States, [‡]Graduate School of Nanoscience and Technology (WCU), Korea Advanced Institute of Science and Technology, Daejeon, 305-701, Korea, and [£]Department of Materials Science and Engineering, University of Maryland, College Park, Maryland, 20742, United States. [§]Authors with equal contributions.

* Address correspondence to: rubloff@umd.edu; binghu@umd.edu; slee@umd.edu

Downloaded from pubs.acs.org/ancac3/article-supplement/1344758/pdf/nn401818t_si_001/ by YALE UNIV user on 12 September 2026

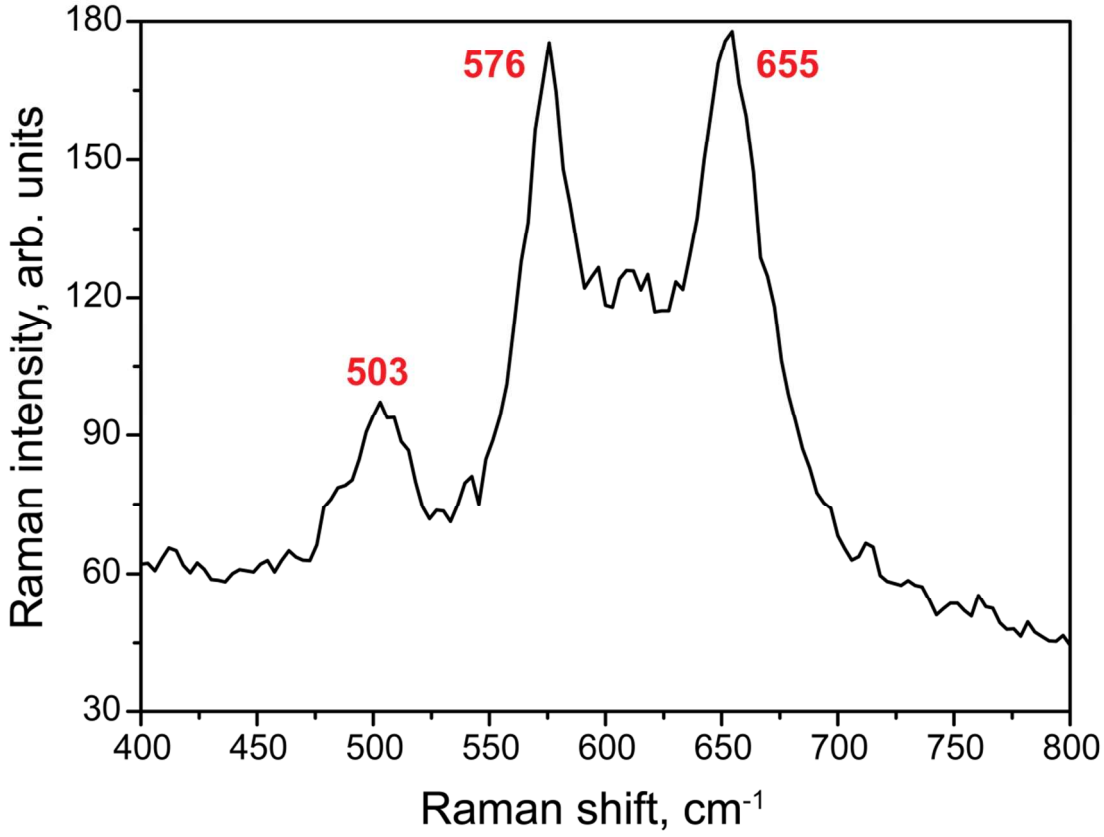


Figure S1. Raman spectra of MnO_2 electrodeposited on cellulose paper wrapped with CNTs (P-CM).

Downloaded from pubs.acs.org/ancac3/article-supplement/13447758/pdf/nn401818t_si_001/ by YALE UNIV user on 12 September 2026

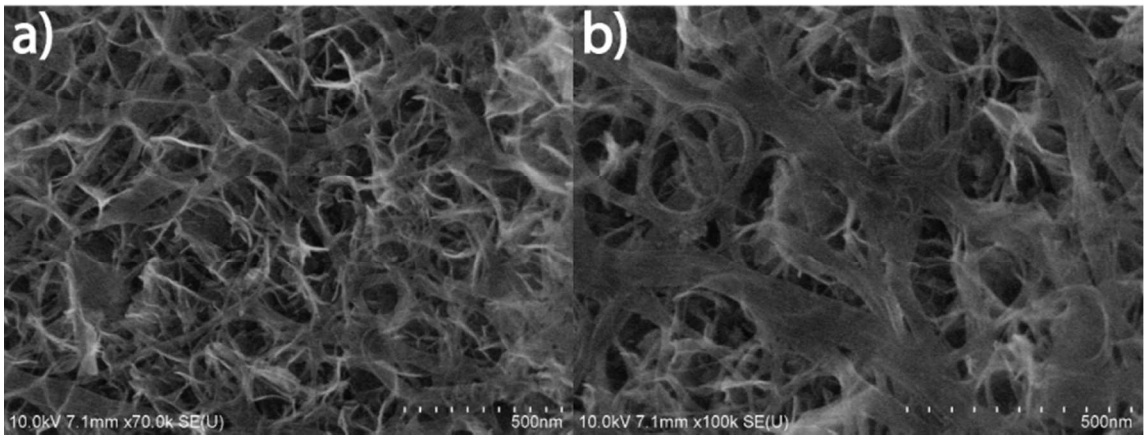


Figure S2. SEM images of paper/CNTs/MnO_2/CNTs (P-CMC) at high magnification of (a) 70k and (b) 100k. CNTs on top of the MnO_2 layers can be clearly identified in these images.

Downloaded from pubs.acs.org/ancac3/article-supplement/13447758/pdf/nn401818t_si_001/ by YALE UNIV user on 12 September 2026

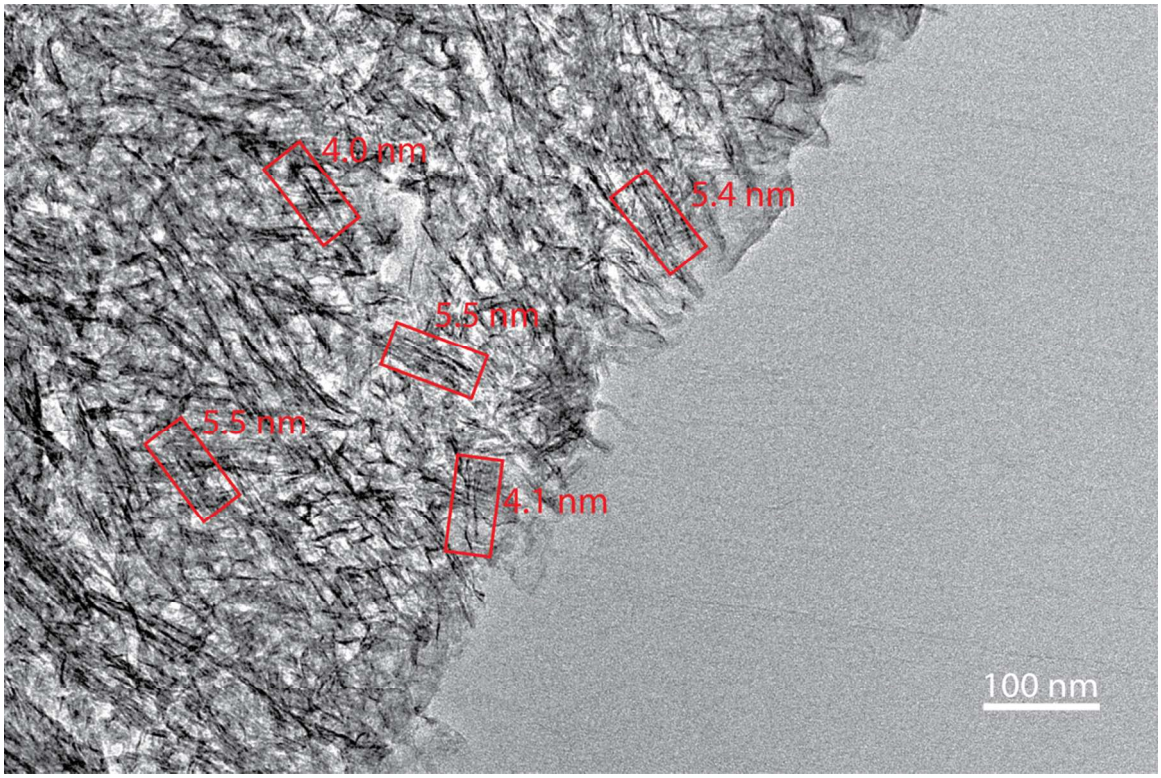


Figure S3. TEM image of the MnO_2 layer in the microtomed cross-section of sample P-CMC. Square areas in red show pairs of parallel lines presenting the cross-sectional view of MnO_2 nanosheets. Distances between parallel lines are roughly estimated as the thickness of the nanosheet.

Downloaded from pubs.acs.org/ancac3/article-supplement/13447758/pdf/nn401818t_si_001/ by YALE UNIV user on 12 September 2026

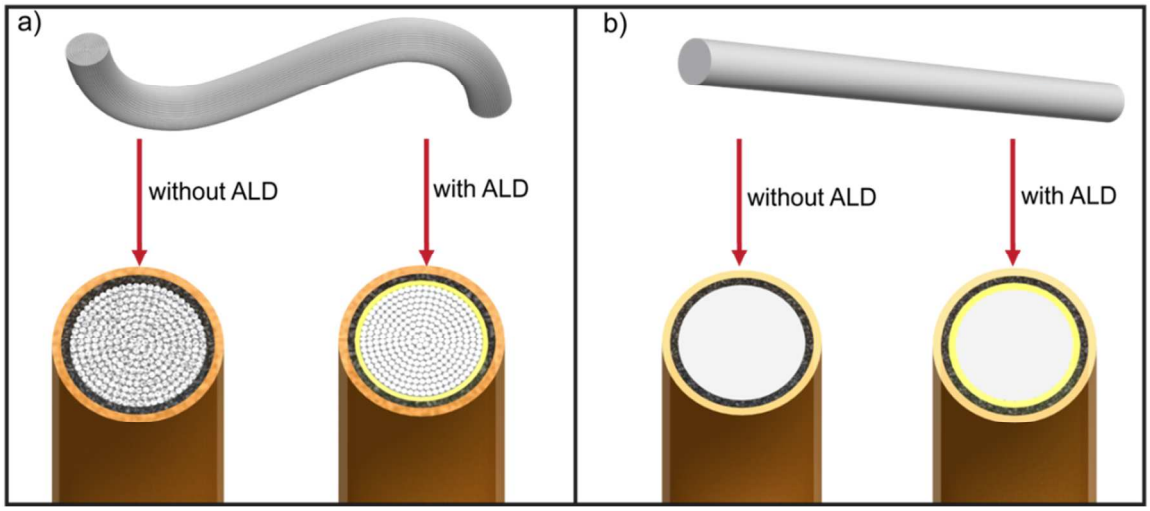


Figure S4. Schematic illustration of the fabrication on (a) cellulose fibers and (b) polyester fibers. For both fibers (white color), electrodeposition of MnO_2 (brown color) was prepared on CNTs (black color) coated fibers with and without Al_2O_3 coating (yellow color) by ALD process.

Downloaded from pubs.acs.org/ancac3/article-supplement/13447758/pdf/nn401818t_si_001/ by YALE UNIV user on 12 September 2026

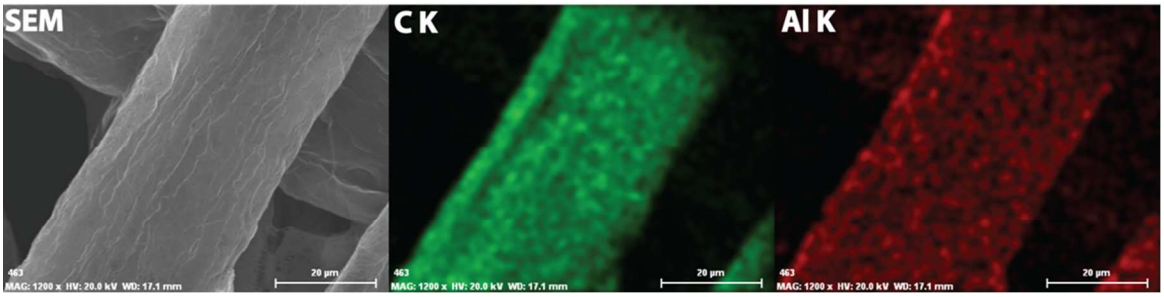


Figure S5. SEM image and EDS mapping of C (green color) and Al (red color) on a segment of cellulose fibers coated with Al_2O_3 and CNTs layers (paper/Al_2O_3/CNTs).

Downloaded from pubs.acs.org/ancac3/article-supplement/13447758/pdf/nn401818t_si_001/ by YALE UNIV user on 12 September 2026