Supplemental Information to

Low-cost, high-throughput fabrication of cloth-based microfluidic devices using a photolithographical patterning technique

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Table S1 Carbon and oxygen atomic composition in percentage, of the cloth samples with different treatments (n=3).

Cloth samples	Treatment	Atomic % C	Atomic % O	O/C ratio	EDS spectra
Cloth piece*	0-min NaOH pretreatment	52.44 ±0.33	47.29±0.29	0.9020±0.0111	**Figure S6**
Cloth piece*	5-min NaOH pretreatment	52.00±0.35	47.79±0.29	0.9192±0.0118	**Figure S7**
Cloth piece*	10-min NaOH pretreatment	52.02±0.25	47.74±0.22	0.9178±0.0086	**Figure S8**
μCAD's test zone (being coated with photoresist)	0-min NaOH pretreatment, without post-treatment	54.99±0.21	44.76±0.17	0.8140±0.0061	**Figure S9**
μCAD's test zone (being coated with photoresist)	5-min NaOH pretreatment, without post-treatment	55.60±1.50	44.19±1.49	0.7959±0.0471	**Figure S10**
μCAD's test zone (being coated with photoresist)	10-min NaOH pretreatment, without post-treatment	55.53±0.81	44.24±0.81	0.7971±0.0257	**Figure S11**
μCAD's test zone (being coated with photoresist)	5-min NaOH pretreatment, 5-min 3 wt% NaOH post-treatment	55.14±1.15	44.63±1.15	0.8102±0.0380	**Figure S12**
μCAD's test zone (being coated with photoresist)	5-min NaOH pretreatment, 5-min 3 wt% SDS post-treatment	54.14±0.91	45.61±0.84	0.8427±0.0294	**Figure S13**
μCAD's hydrophobic zone (being coated with photoresist)	5-min NaOH pretreatment, 5-min 3 wt% SDS post-treatment	59.35±0.30	40.40±0.33	0.6810±0.0091	**Figure S14**

μCAD's hydrophobic zone (being coated with photoresist)	5-min NaOH pretreatment, 5-min 3 wt% NaOH post-treatment	59.51±0.31	40.10±0.45	0.6739±0.0110	**Figure S15**
Cloth pieces (not being coated with photoresist)	5-min NaOH pretreatment, 5-min 3 wt% NaOH post-treatment	51.95±0.03	47.70±0.16	0.9182±0.0036	**Figure S16**
Cloth pieces (not being coated with photoresist)	5-min NaOH pretreatment, 5-min 3 wt% SDS post-treatment	52.18±0.19	47.52±0.30	0.9107±0.0090	**Figure S17**
Cloth pieces (not being coated with photoresist)	5-min NaOH pretreatment, without post-treatment	52.20±0.14	47.52±0.21	0.9103±0.0061	**Figure S18**

*****Dumbbell-shaped cloth pieces prepared by a handheld cutter, which were used as test zone for evaluating the wicking property of the pretreated cloth fabric (**Figure S1**).

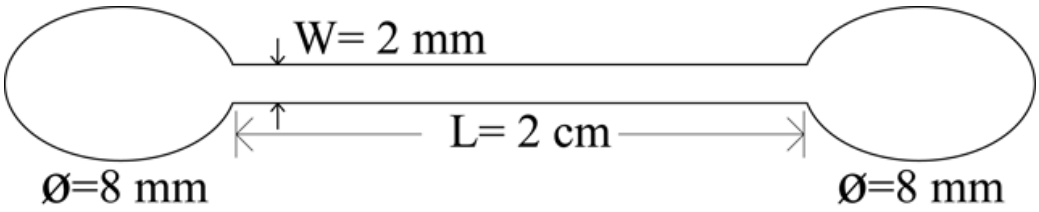


Figure S1. Design of the dumbbell-shaped test zone in a cloth device for evaluating the wicking property of the cloth fabrics. Here, the inlet and outlet (ø 8 mm) are connected by a 20 mm×2 mm channel. And, the cloth piece's devices were prepared by a handheld cutter, while the μCADs were prepared by a photolithographical patterning technique.

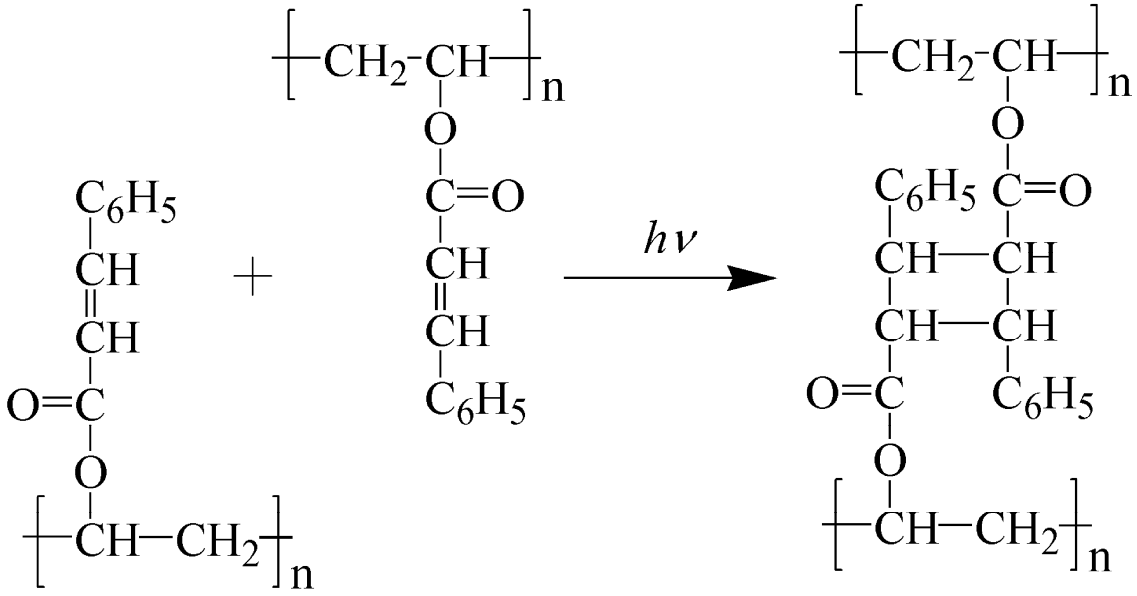
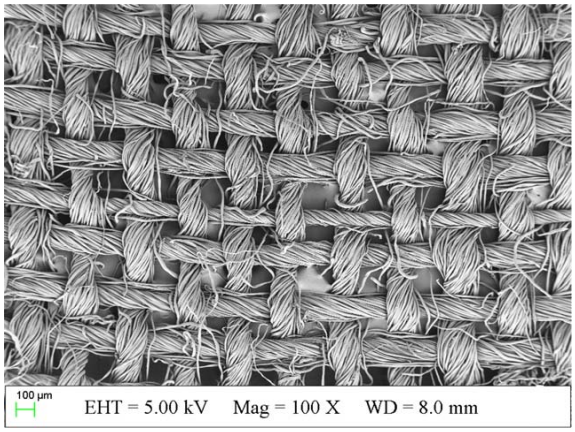
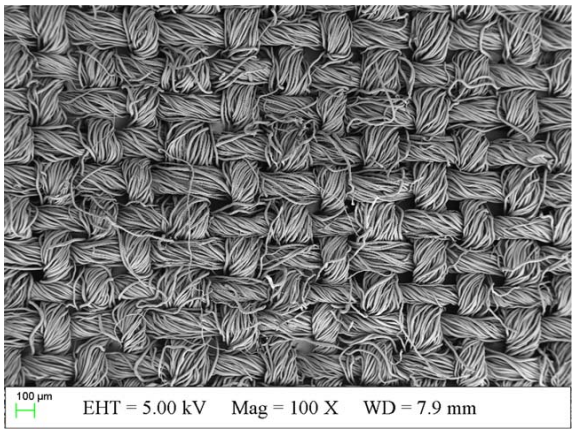


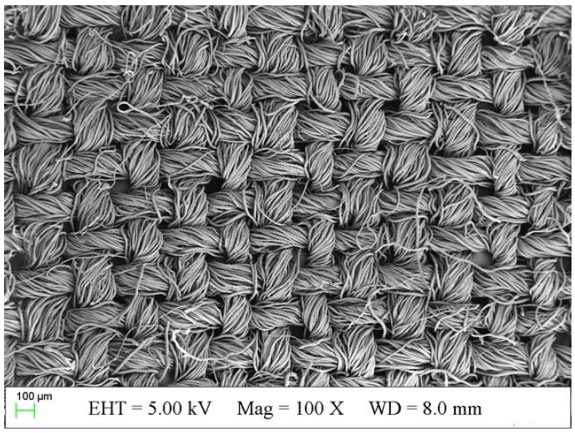
Figure S2. Photoinduced cross-linking reactions of the PVC photoresist.



(A)



(B)



(C)

Figure S3. SEM image (100×) of cotton cloth fabric with 0-min **(A)**, 5-min **(B)**, or 10-min **(C)** NaOH pretreatment.

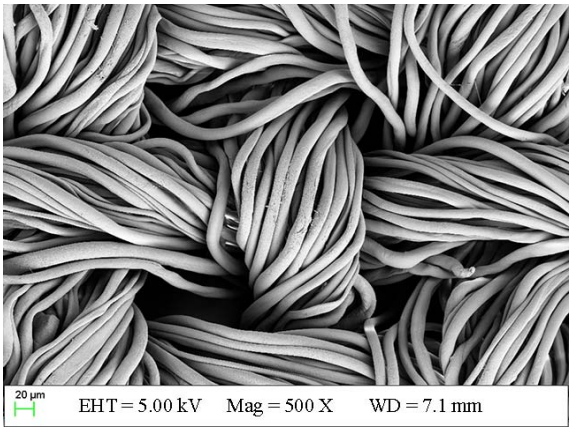
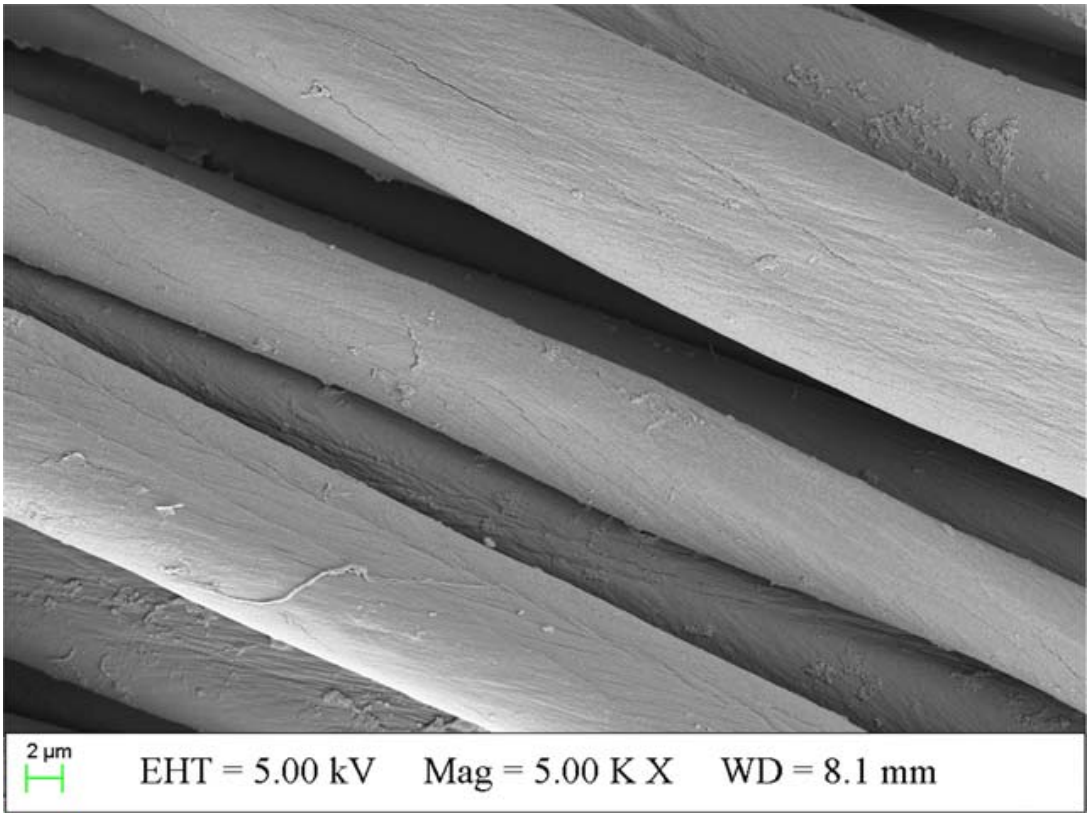
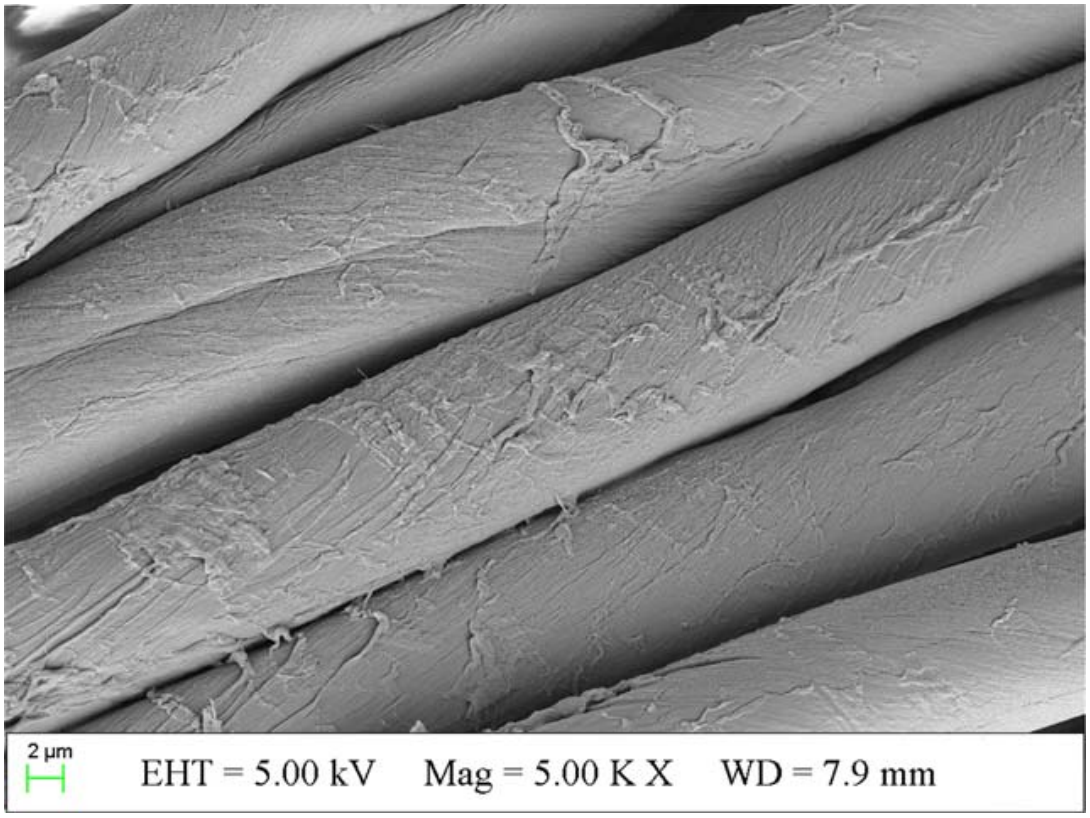


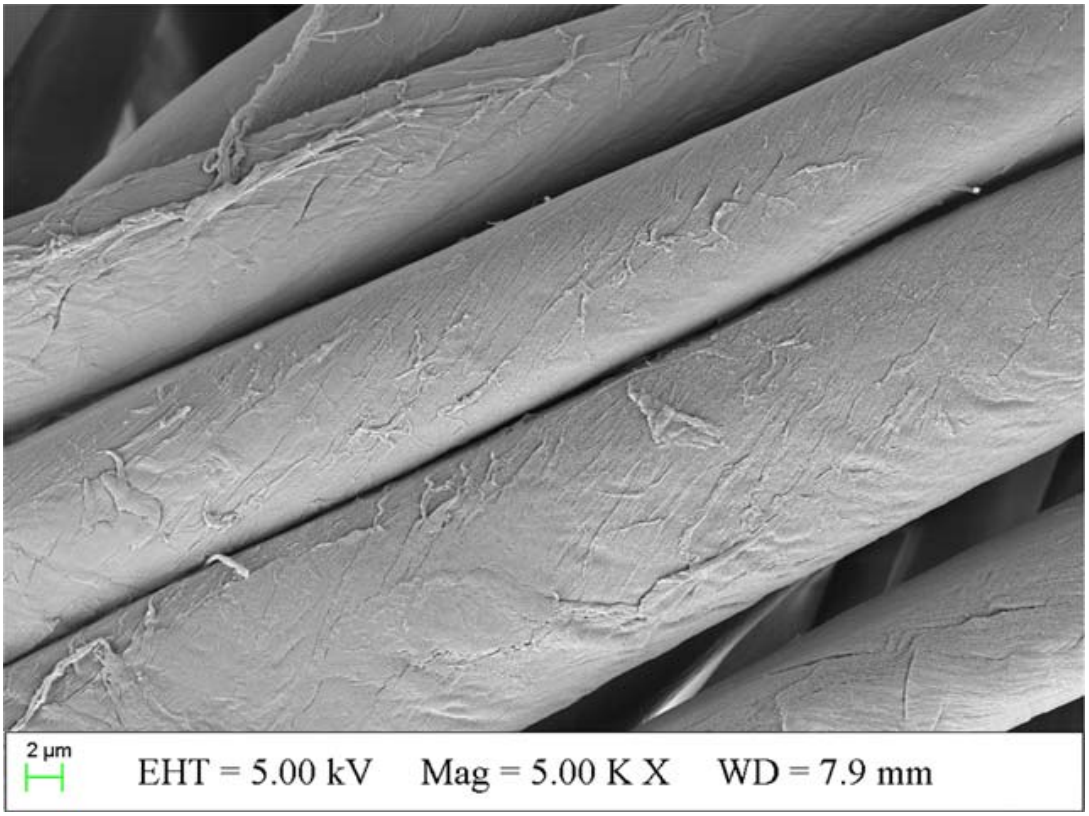
Figure S4. SEM image (500×) showing the hydrophilic part of 10-min NaOH pretreated cloth piece before photolithography.


2 µm
EHT = 5.00 kV
Mag = 5.00 K X
WD = 8.1 mm

(A)


2 µm
EHT = 5.00 kV
Mag = 5.00 K X
WD = 7.9 mm

(B)



(C)

Figure S5. SEM image of cotton fiber surface in the cloth fabric pretreated for 0, 5 or 10 min using NaOH solution. **(A)** SEM image of the cotton fiber in the cloth fabric without any pretreatment, which shows that the fiber surface is smooth; **(B)** SEM image of the cotton fiber in the cloth fabric after pretreatment for 5 min using NaOH solution, which shows that the fiber surface get rough, compared with that in cloth fabric without any pretreatment; **(C)** SEM image of the cotton fiber in the cloth fabric after pretreatment for 10 min using NaOH solution, which shows that the fiber surface get rough, compared with that in cloth fabric without any pretreatment, and that the morphology of fiber surface is similar to that in the cloth fabric pretreated for 5 min using NaOH solution.

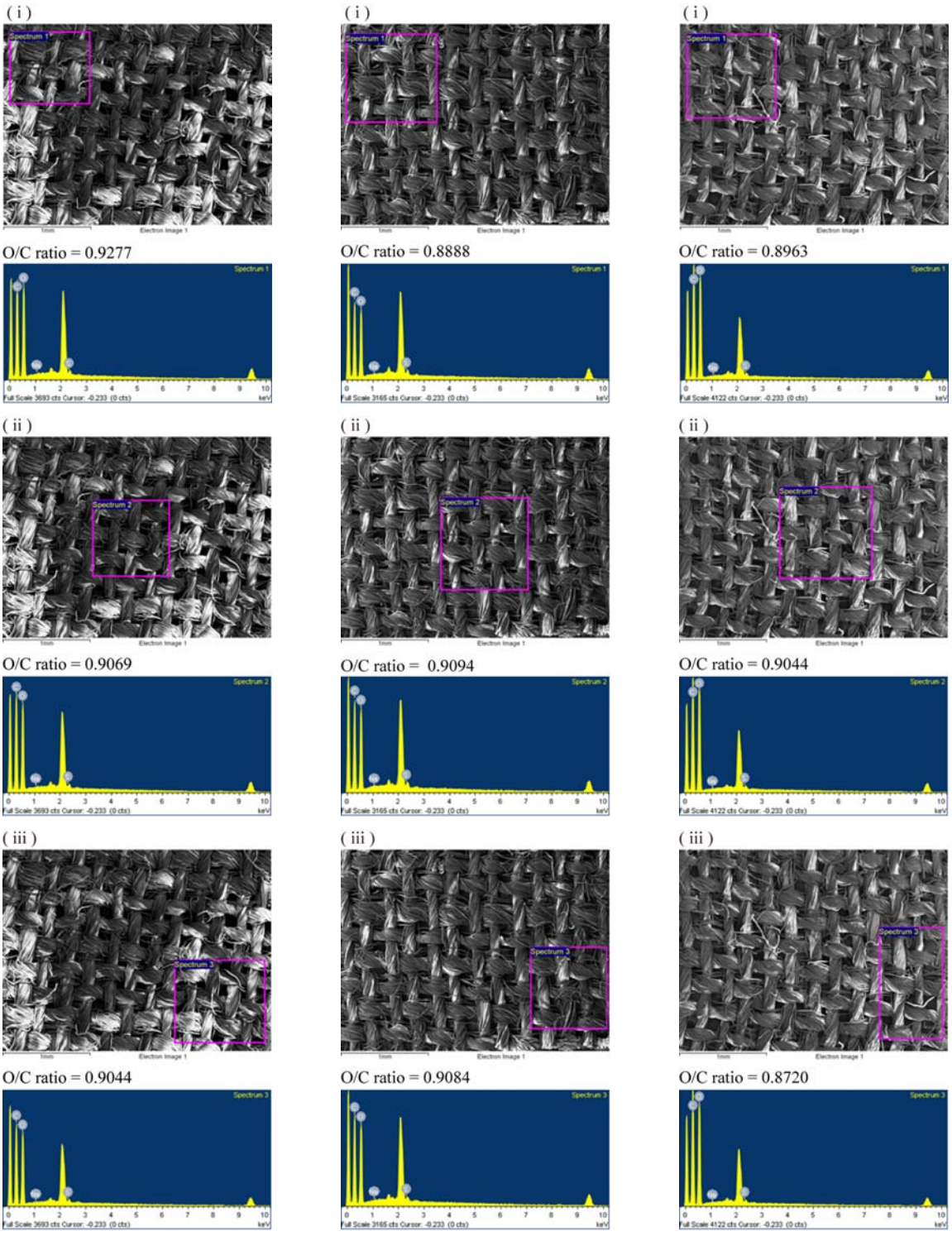


Figure S6. SEM-EDS image of three cloth pieces (Sample-1, Sample-2, Sample-3) with 0-min NaOH pretreatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

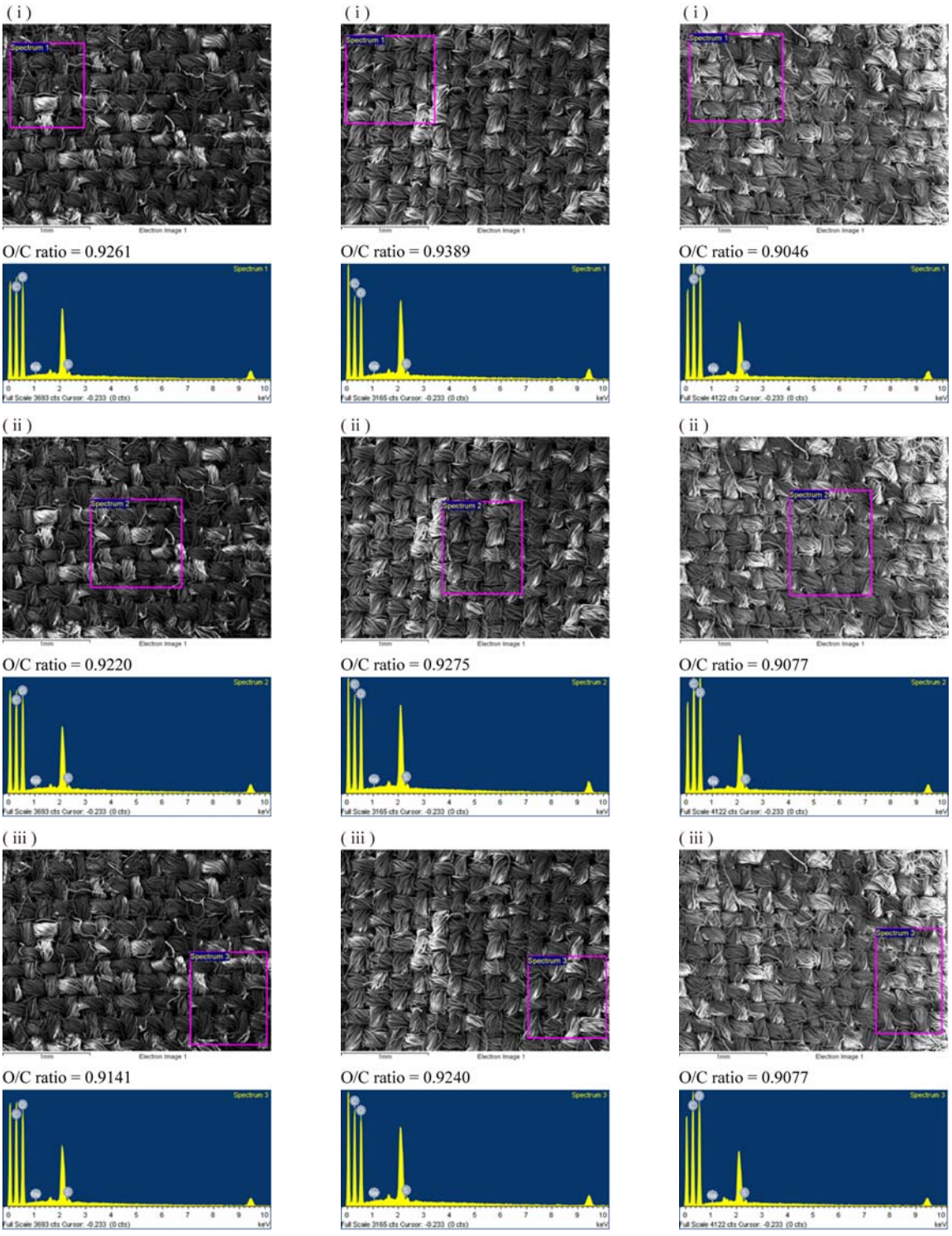


Figure S7. SEM-EDS image of three cloth pieces (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

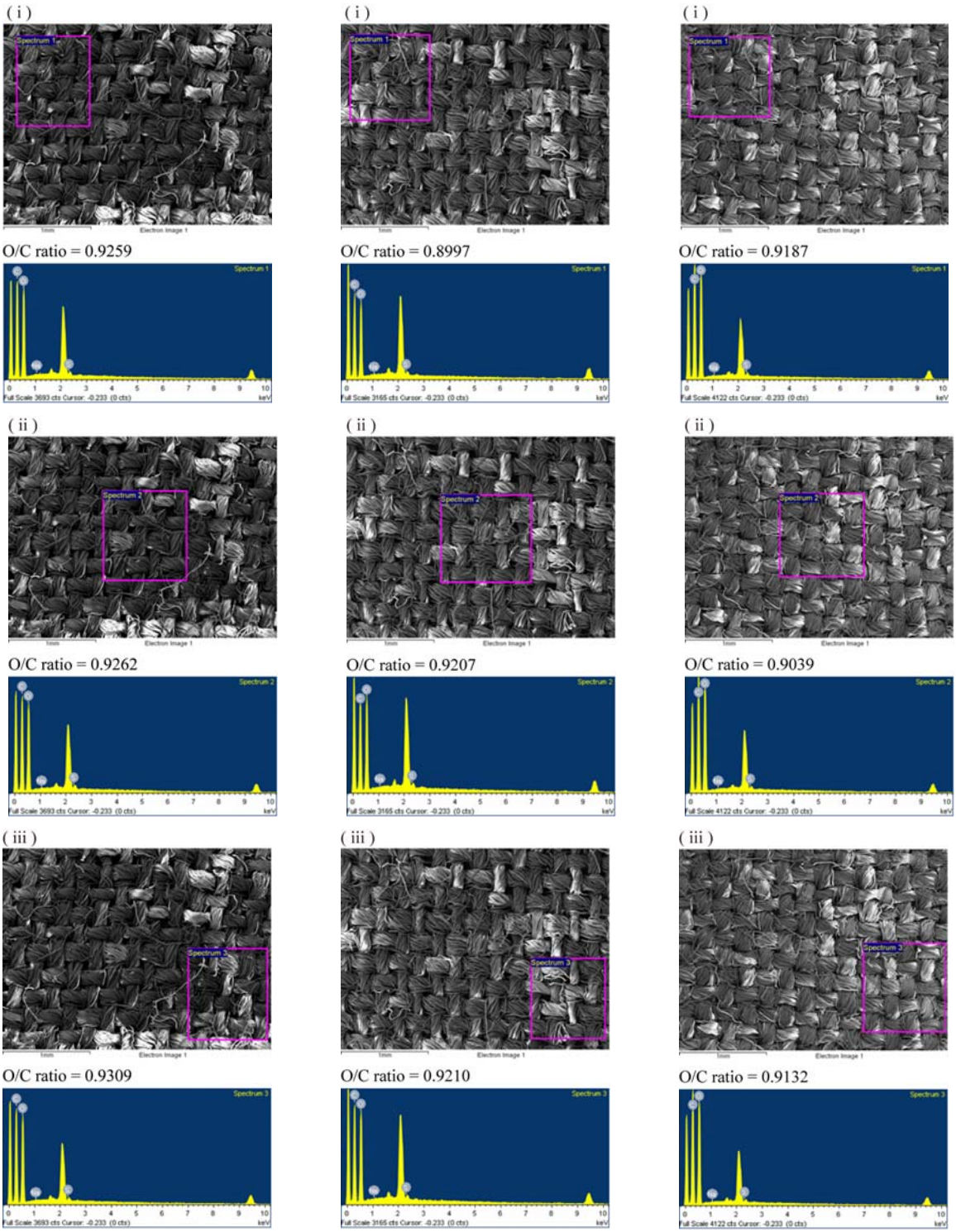


Figure S8. SEM-EDS image of three cloth pieces (Sample-1, Sample-2, Sample-3) with 10-min NaOH pretreatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

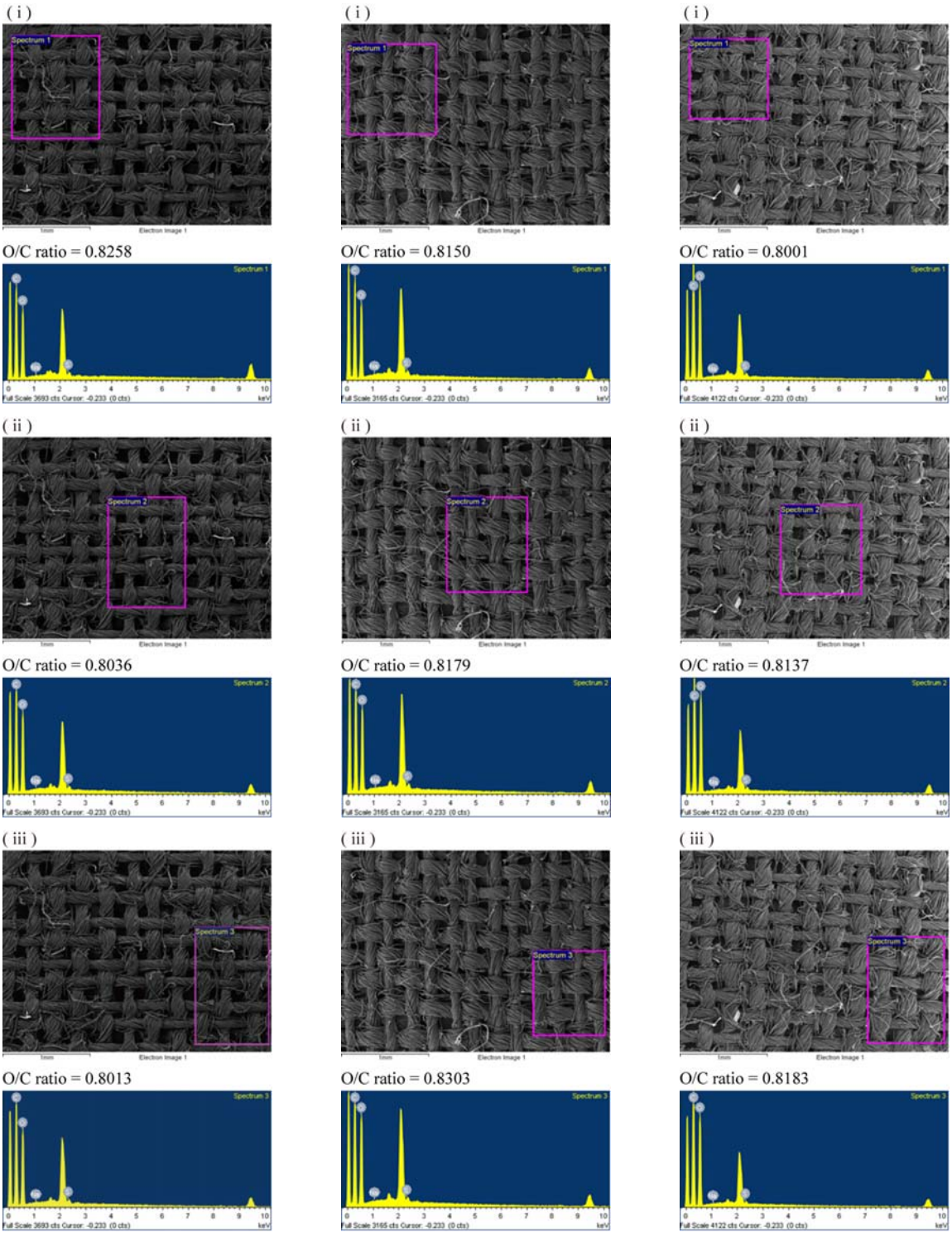


Figure S9. SEM-EDS image of test zone (being coated with photoresist) from three μCADs (Sample-1, Sample-2, Sample-3) with 0-min NaOH pretreatment and no post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

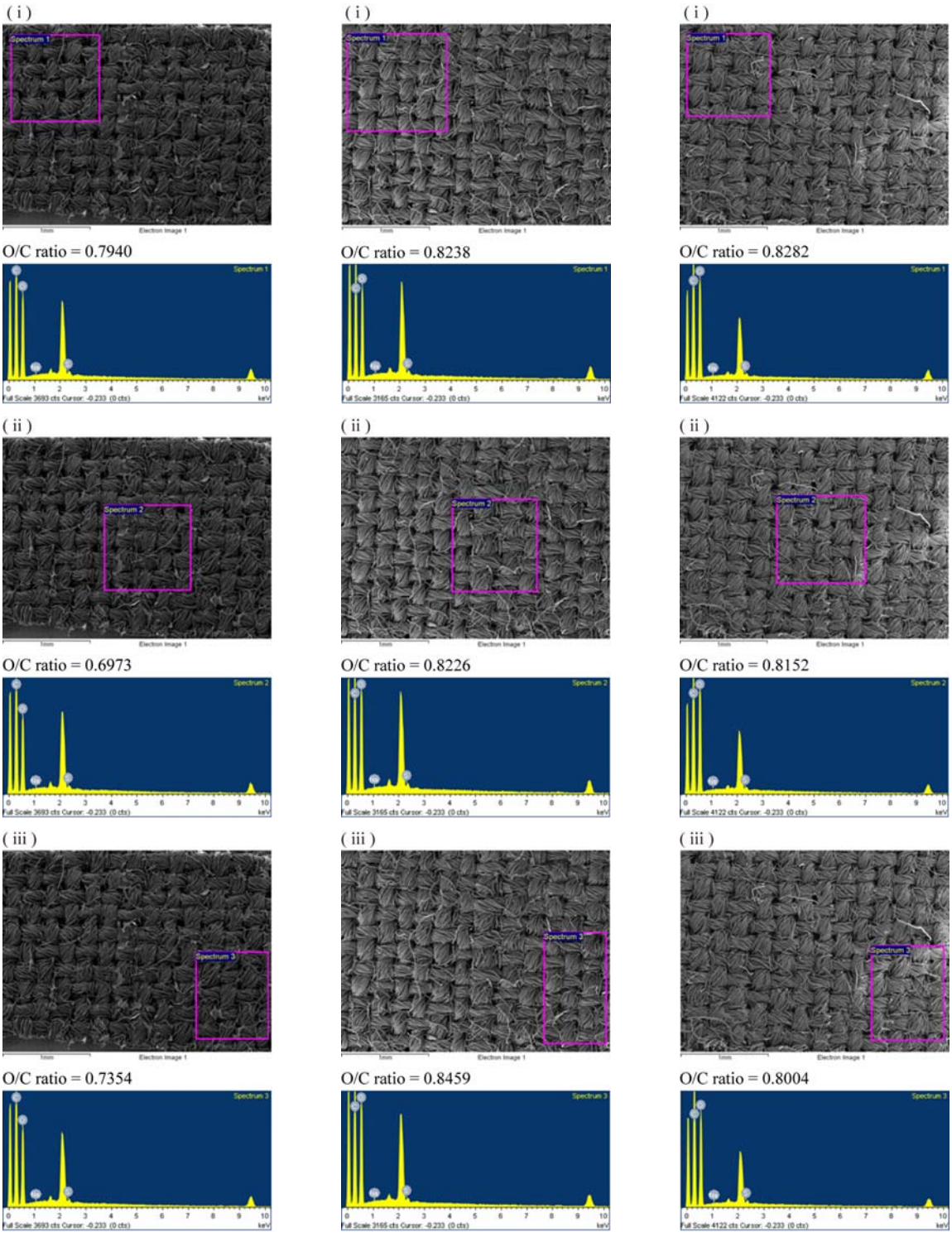


Figure S10. SEM-EDS image of test zone (being coated with photoresist) from three μCADs (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and no post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

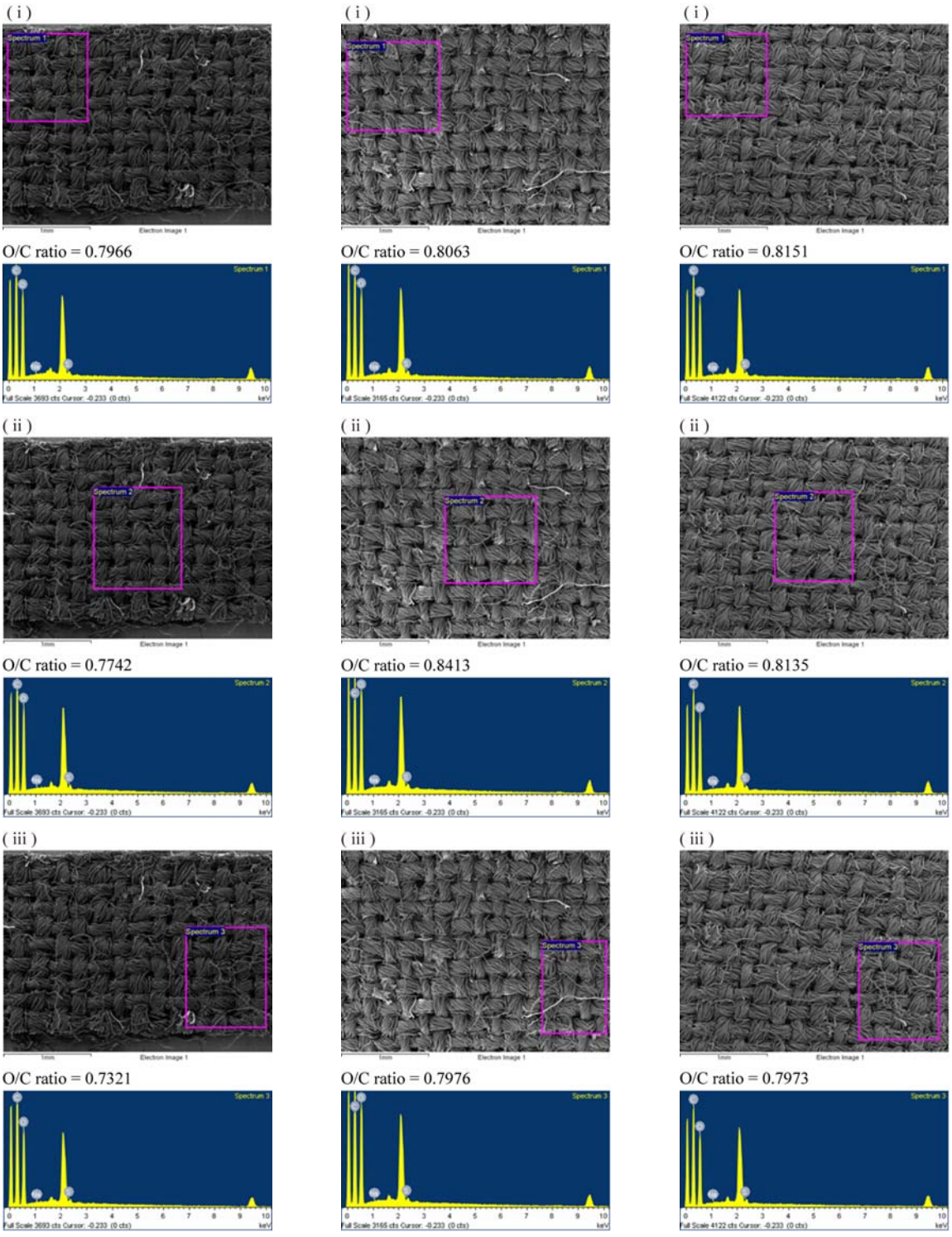


Figure S11. SEM-EDS image of test zone (being coated with photoresist) from three μCADs (Sample-1, Sample-2, Sample-3) with 10-min NaOH pretreatment and no post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

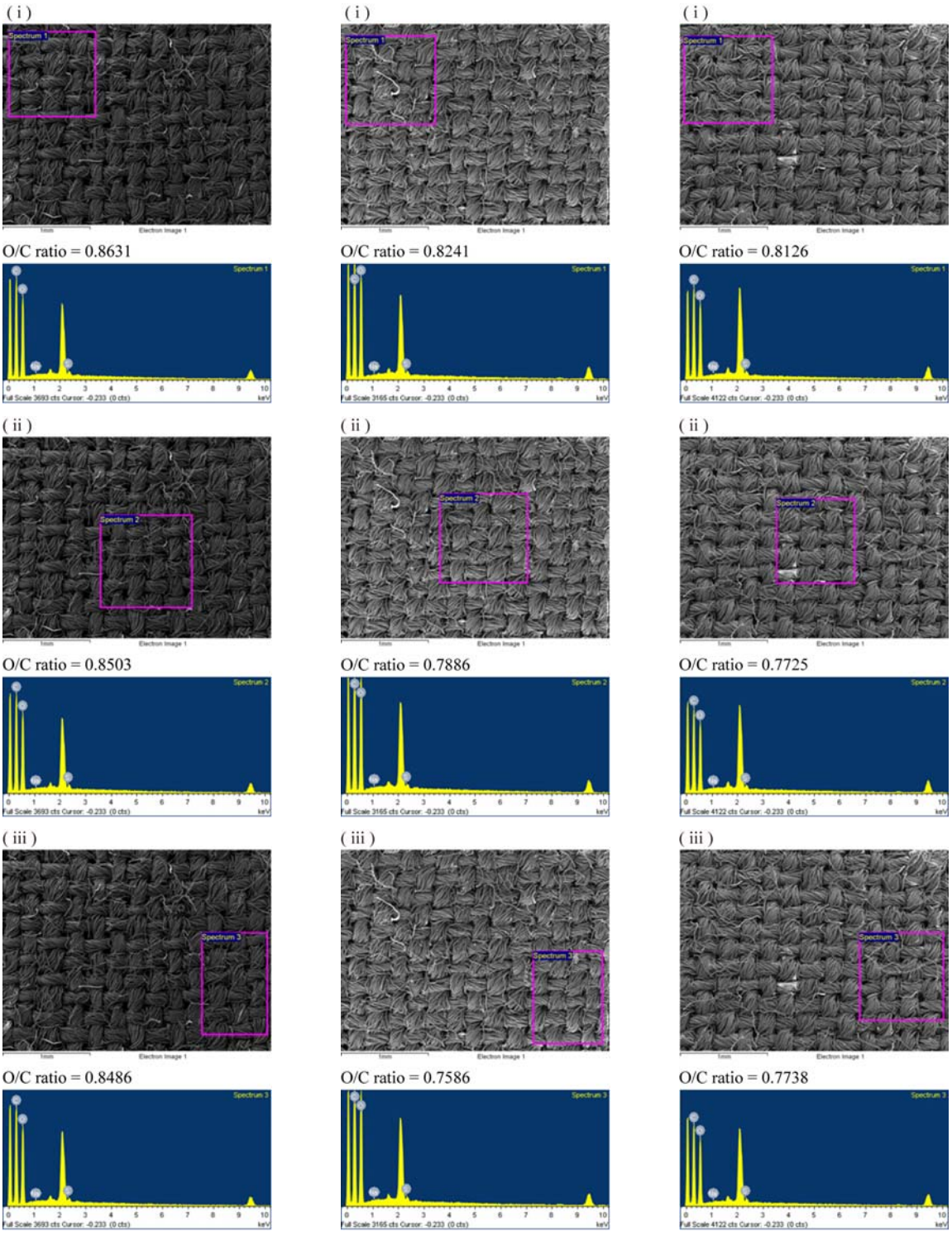


Figure S12. SEM-EDS image of test zone (being coated with photoresist) from three μCADs (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and 5-min 3 wt% NaOH post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

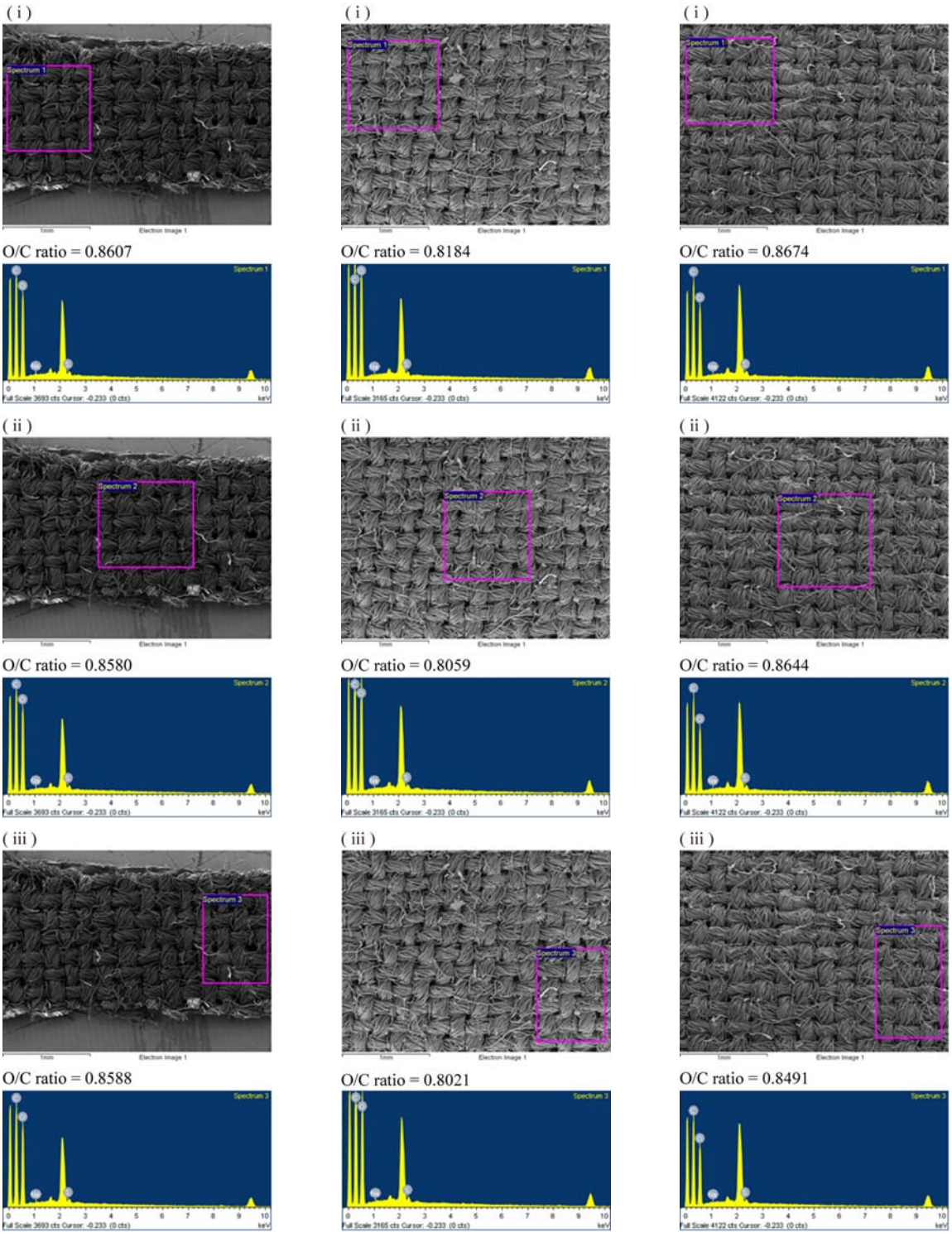


Figure S13. SEM-EDS image of test zone (being coated with photoresist) from three μCADs (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and 5-min 3 wt% SDS post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

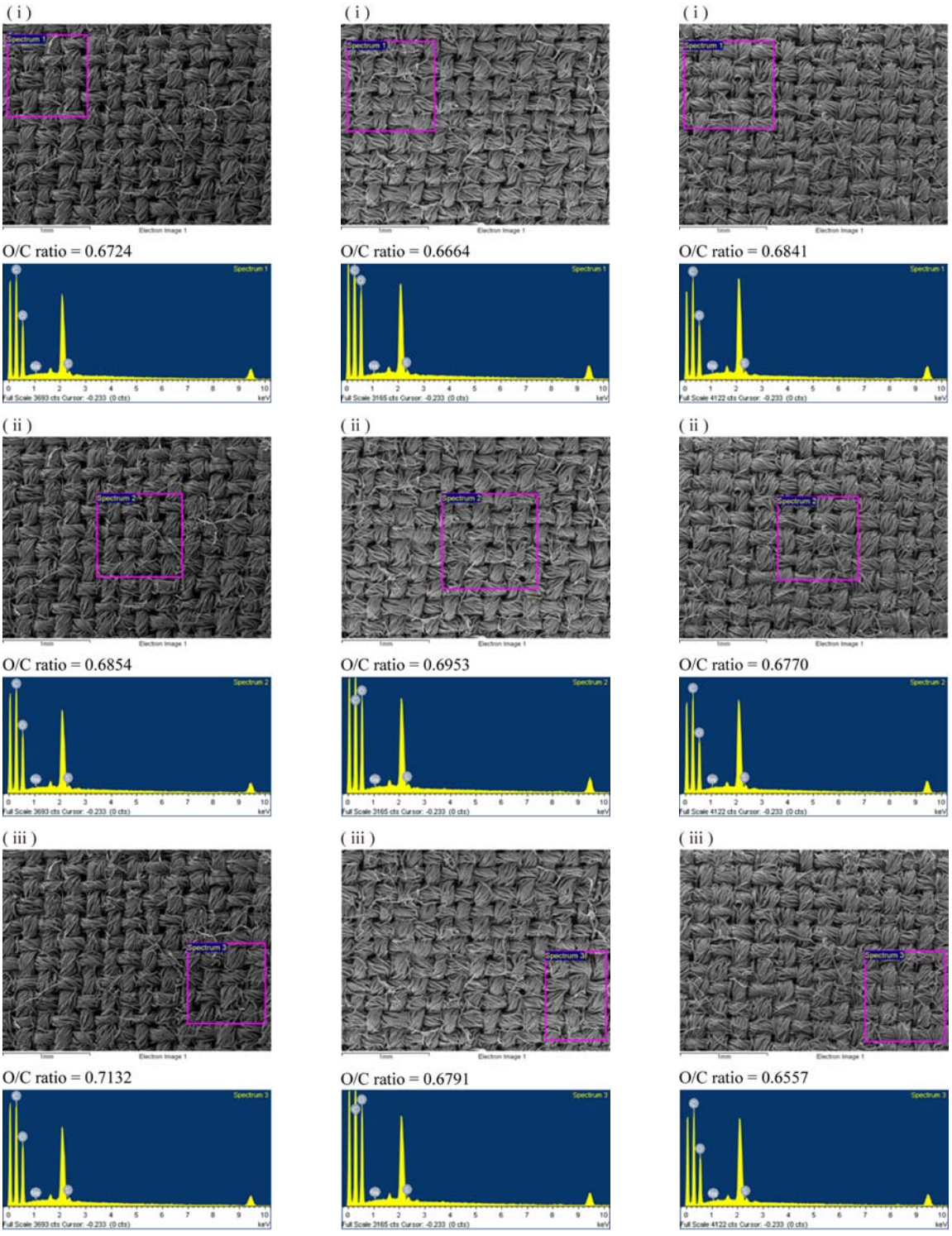


Figure S14. SEM-EDS image of hydrophobic zone (being coated with photoresist) from three μCADs (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and 5-min 3 wt% SDS post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

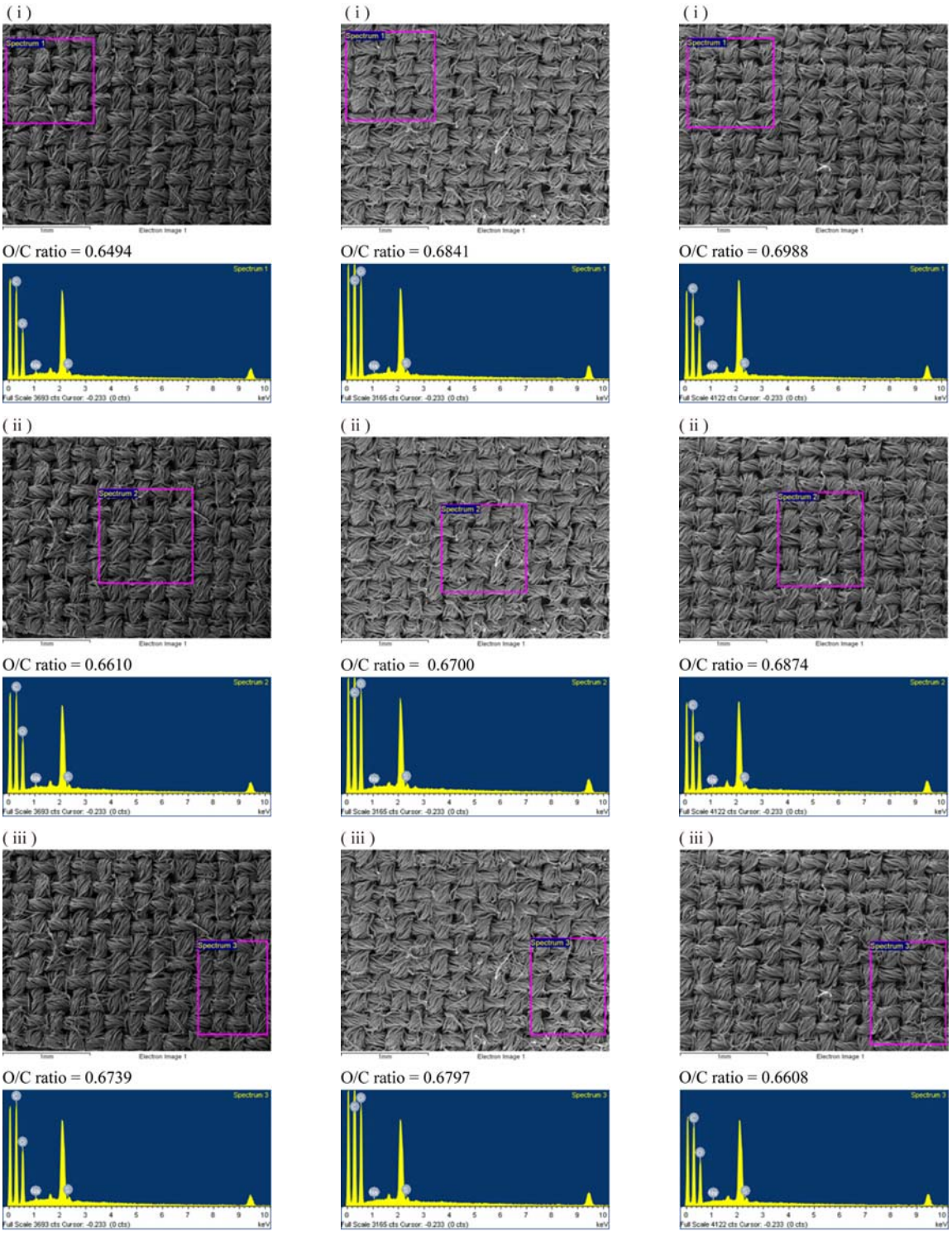


Figure S15. SEM-EDS image of hydrophobic zone (being coated with photoresist) from three μCADs (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and 5-min 3 wt% NaOH post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

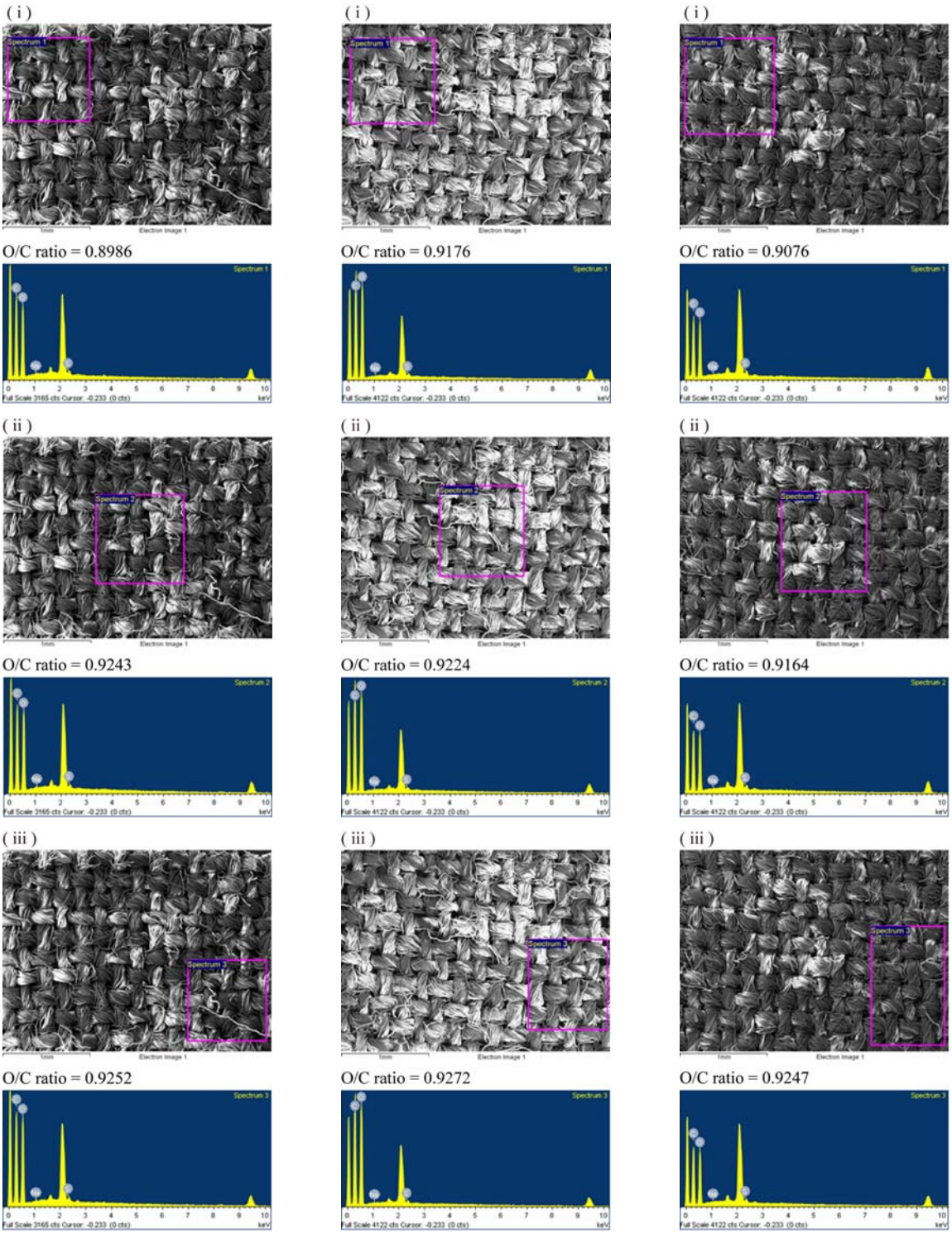


Figure S16. SEM-EDS image of three cloth pieces (not being coated with photoresist) (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and 5-min 3 wt% NaOH post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

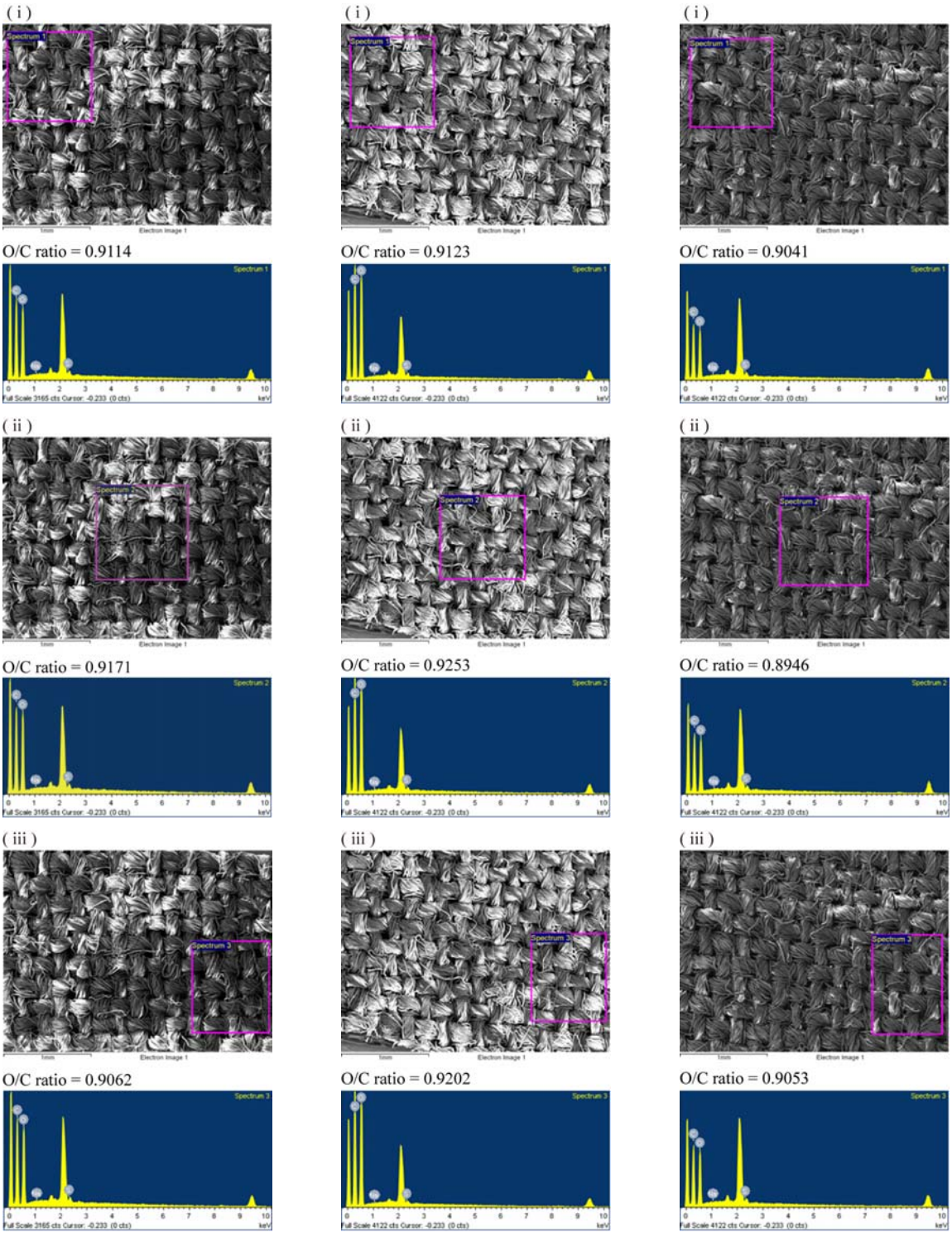


Figure S17. SEM-EDS image of three cloth pieces (not being coated with photoresist) (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and 5-min 3 wt% SDS post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.

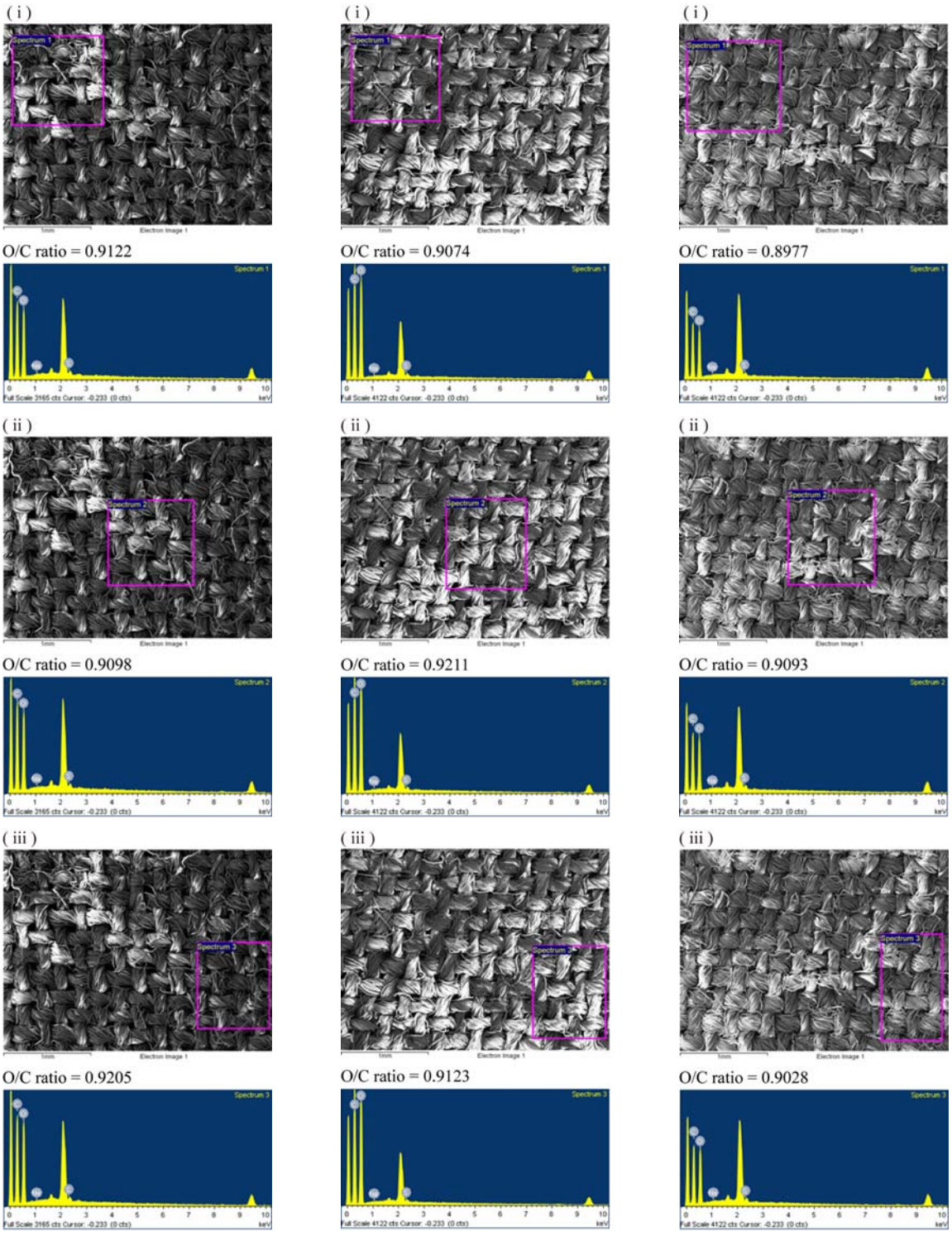
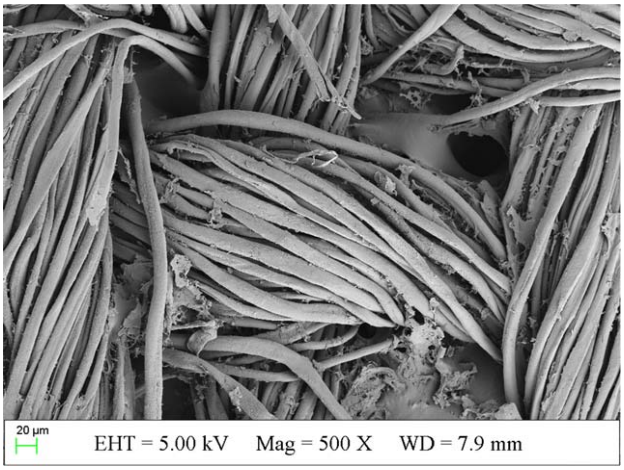
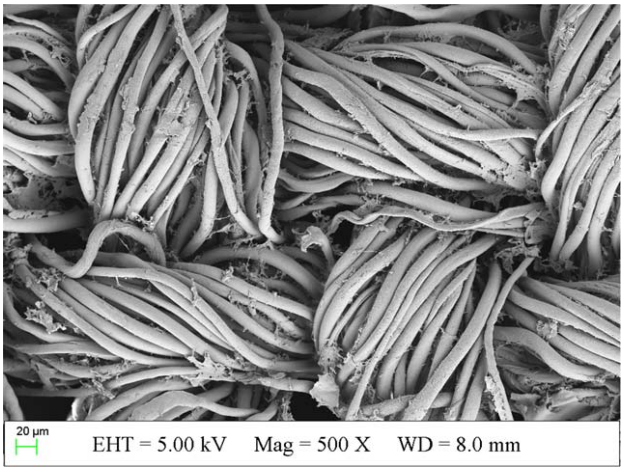


Figure S18. SEM-EDS image of three cloth pieces (not being coated with photoresist) (Sample-1, Sample-2, Sample-3) with 5-min NaOH pretreatment and no post-treatment. For each sample, the spectra of three points marked on the images [(i), (ii) and (iii)] were taken, and the averaging of the O and C atomic percentages was made.



(A)



(B)

Figure S19. SEM images (500×) showing the hydrophilic part of μCADs with 0-min NaOH pretreatment and no post-treatment (**A**), or with 10-min NaOH pretreatment and no post-treatment (**B**).

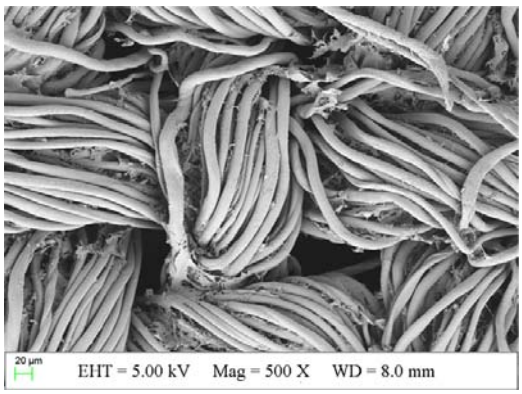


Figure S20. SEM image (500×) of the μCAD's test zone with 5-min NaOH pretreatment and 5-min 3 wt% NaOH post-treatment.

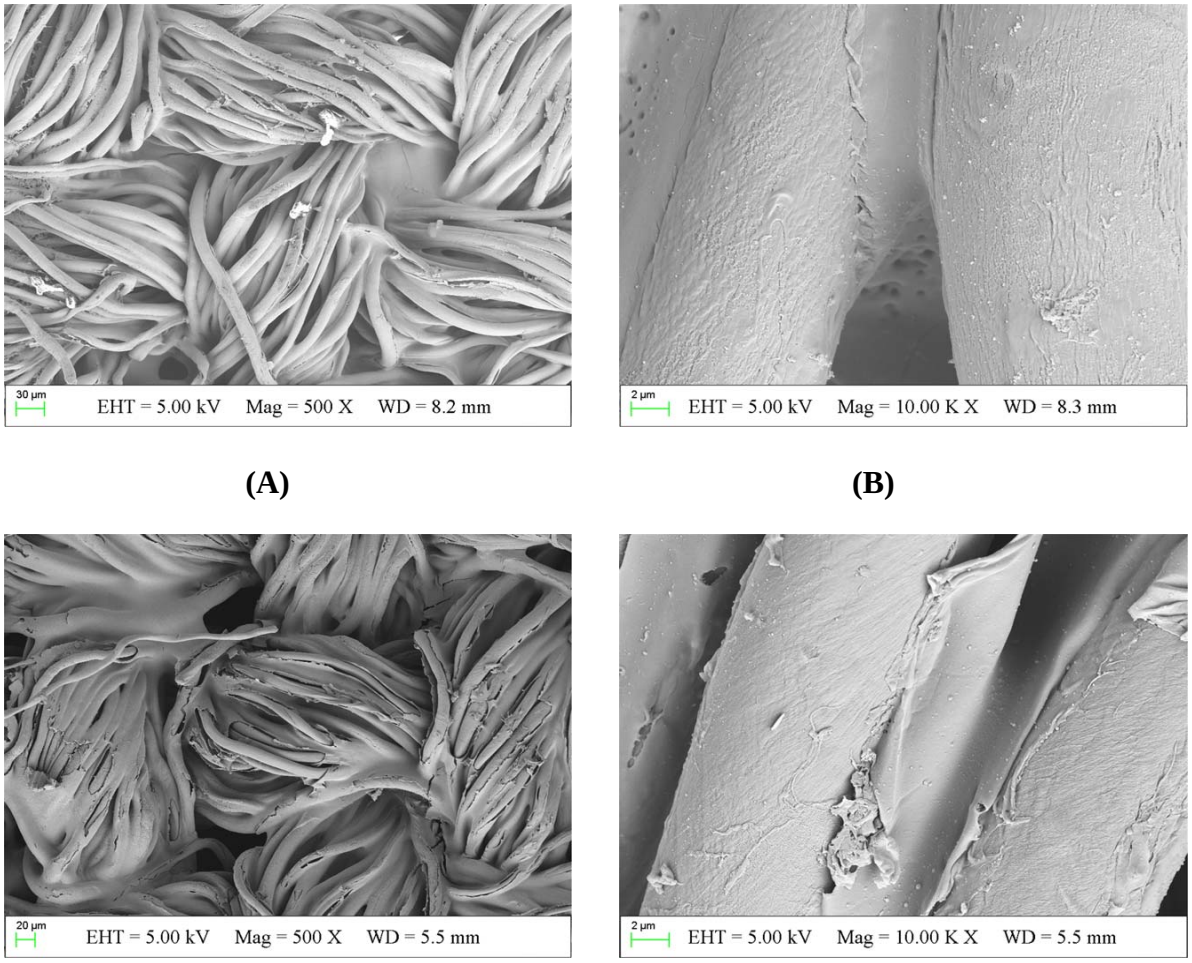
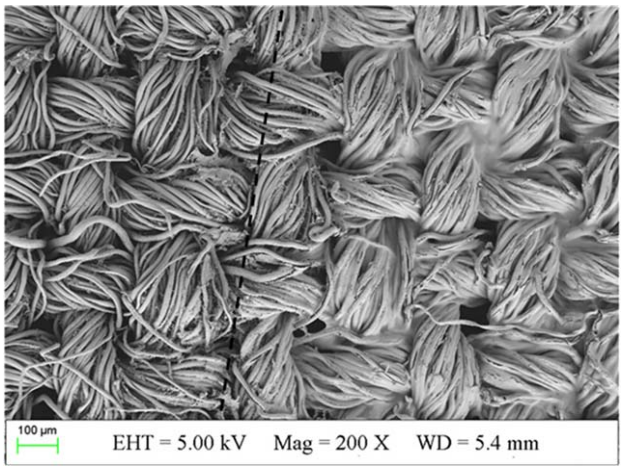
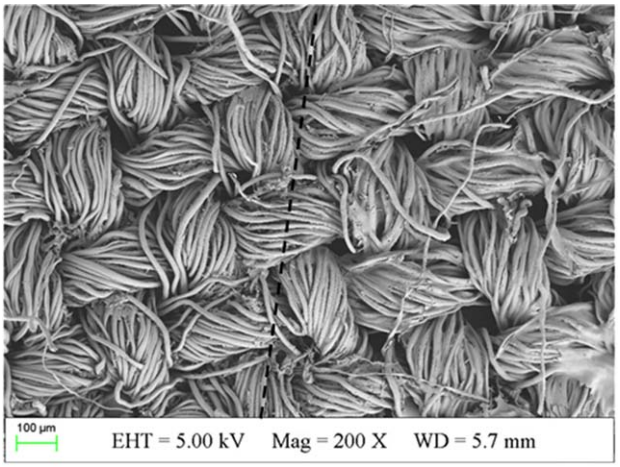


Figure S21. SEM image of the μCAD's hydrophobic zone with 5-min NaOH pretreatment and 5-min 3 wt% SDS post-treatment [**(A)** 500×; **(B)** 10K ×], or with 5-min NaOH pretreatment and 5-min 3 wt% NaOH post-treatment [**(C)** 500×; **(D)** 10K ×].

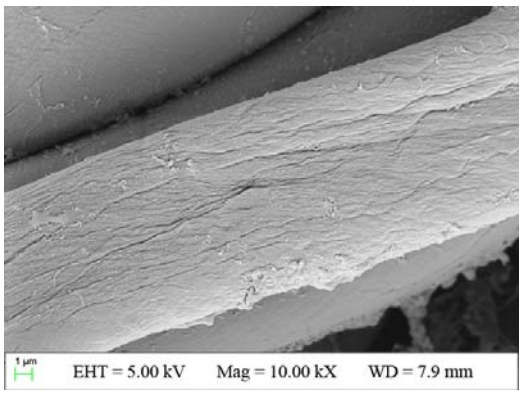


(A)

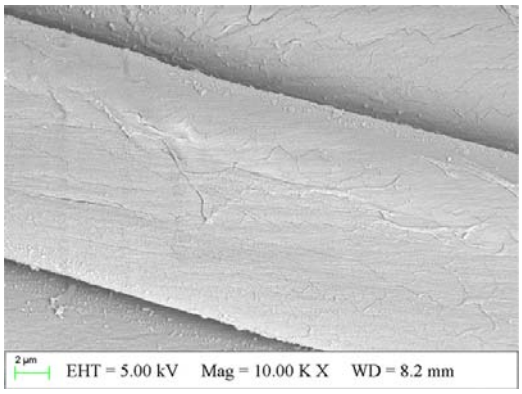


(B)

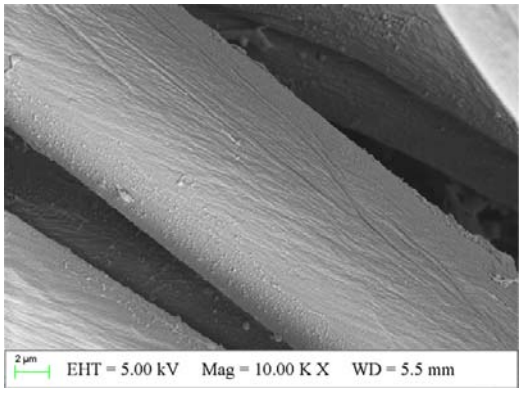
Figure S22. SEM image of the boundary between hydrophilic (left part of the black markings) and hydrophobic (right part of the black markings) areas of µCAD post-treated with 3 wt% NaOH **(A)** or 3 wt% SDS **(B)** solution for 5 min.



(A)



(B)



(C)

Figure S23. SEM image (10K ×) of the μCAD's test zone with 5-min NaOH pretreatment and no post-treatment **(A)**, 5-min NaOH pretreatment and 5-min 3 wt% SDS post-treatment **(B)**, or 5-min NaOH pretreatment and 5-min 3 wt% NaOH post-treatment **(C)**.

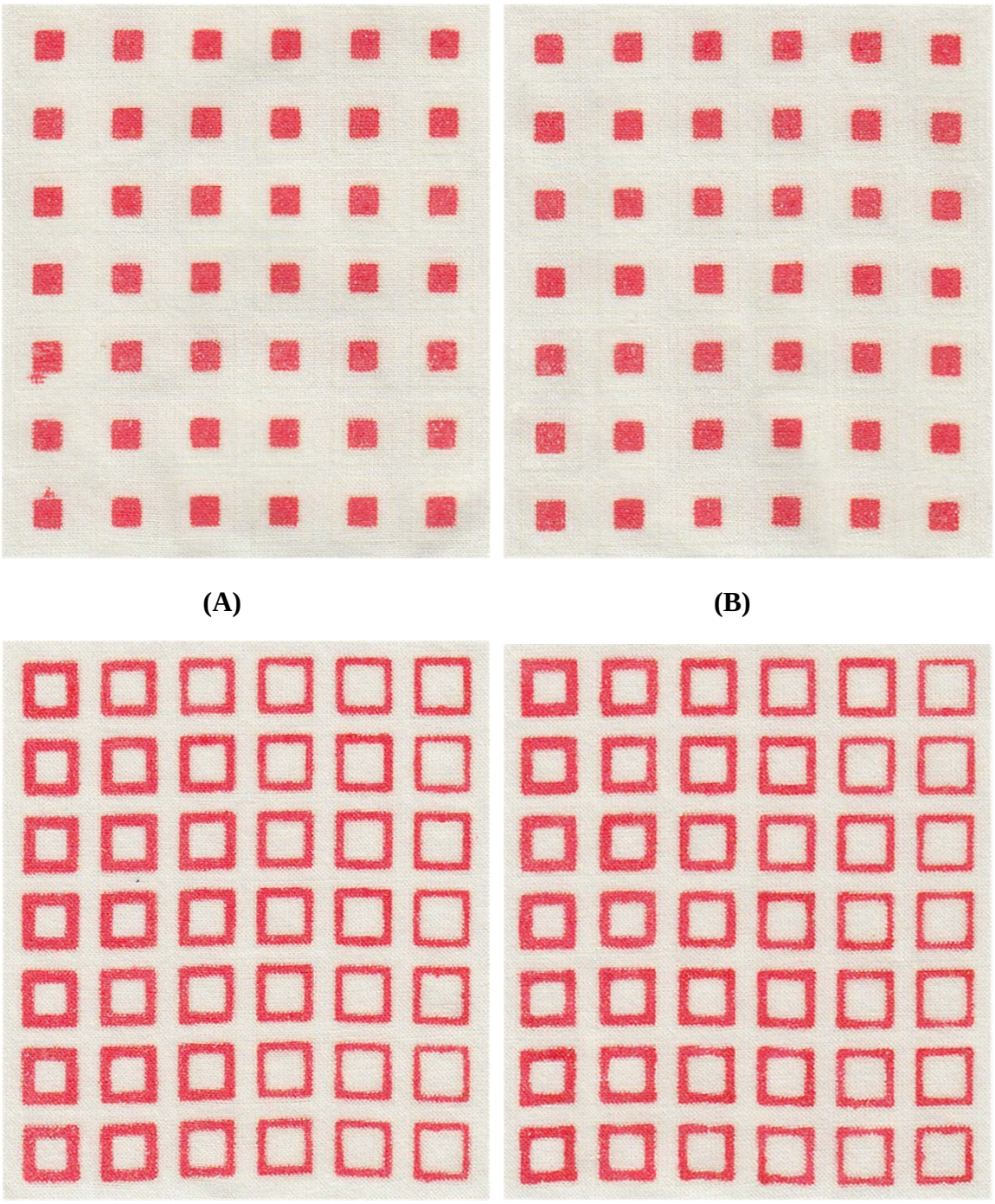


Figure S24. Images of **(A, B)** inner and **(C, D)** outer hydrophilic zones after filling with food dye solution into another two μCADs. In (A), 2 out of 7 100-μm-wide hydrophobic barriers are penetrated through by the dye solution. These μCADs were similar to those in **Figure 4**, and were fabricated at another two different time intervals.