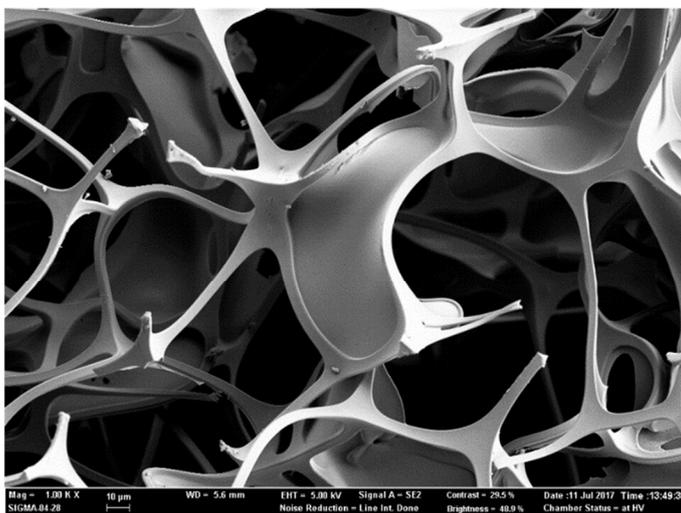


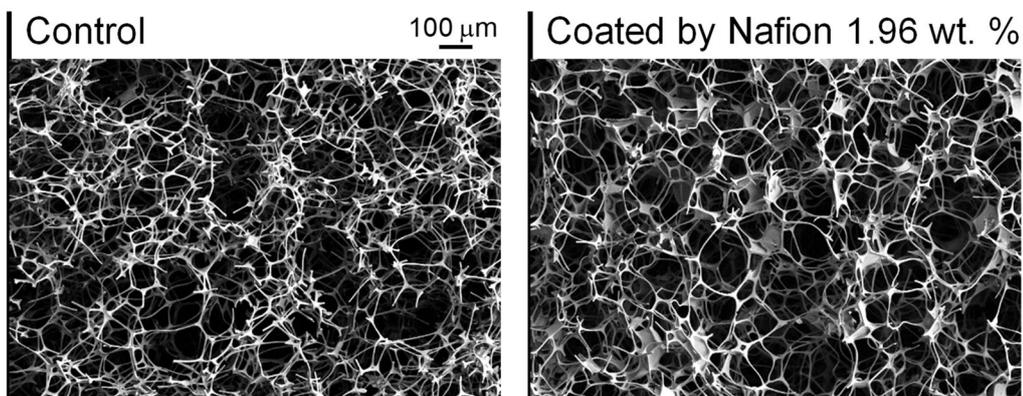
Supporting information for  
Hierarchical Micro/nanoporous Ion Exchangeable Sponge

Jihye Choi, Hyomin Lee\* and Sung Jae Kim\*

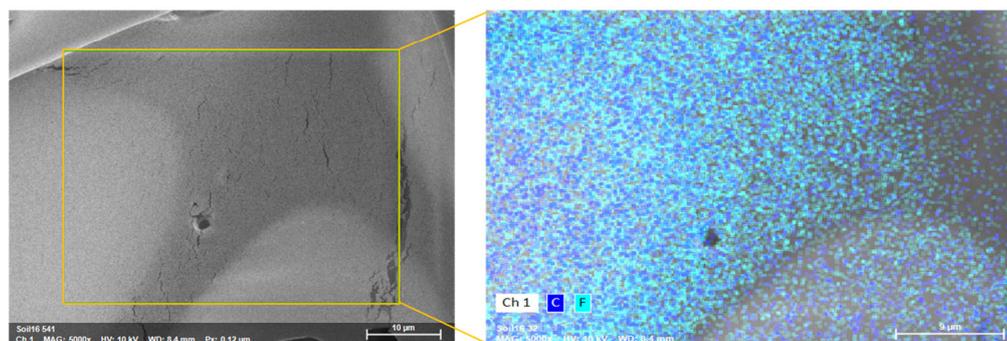
(a)



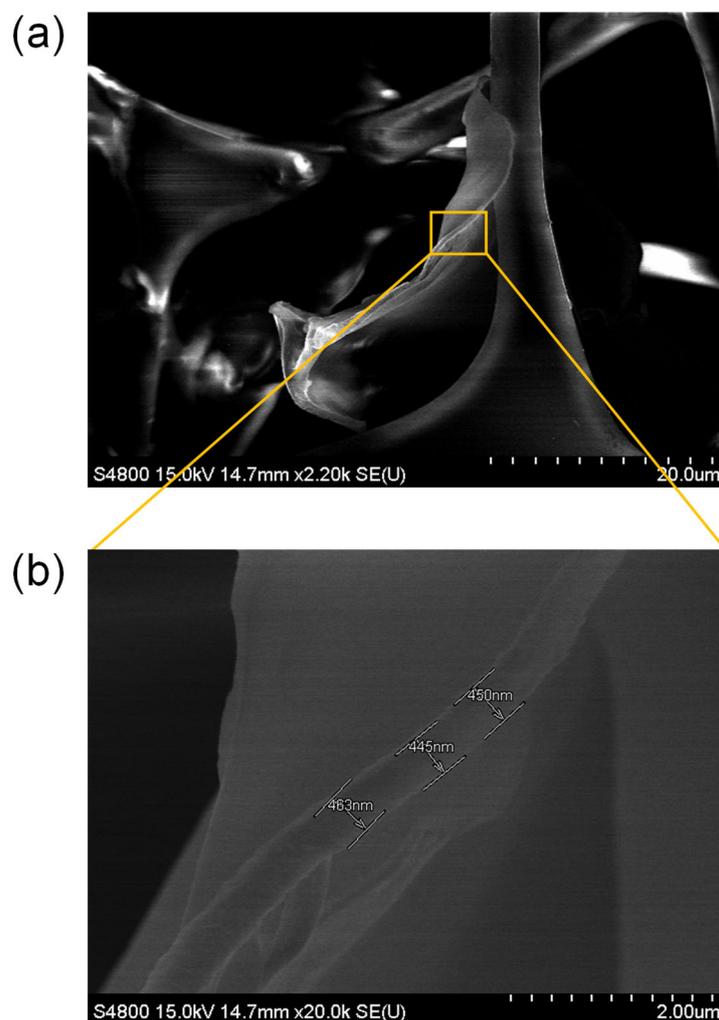
(b)



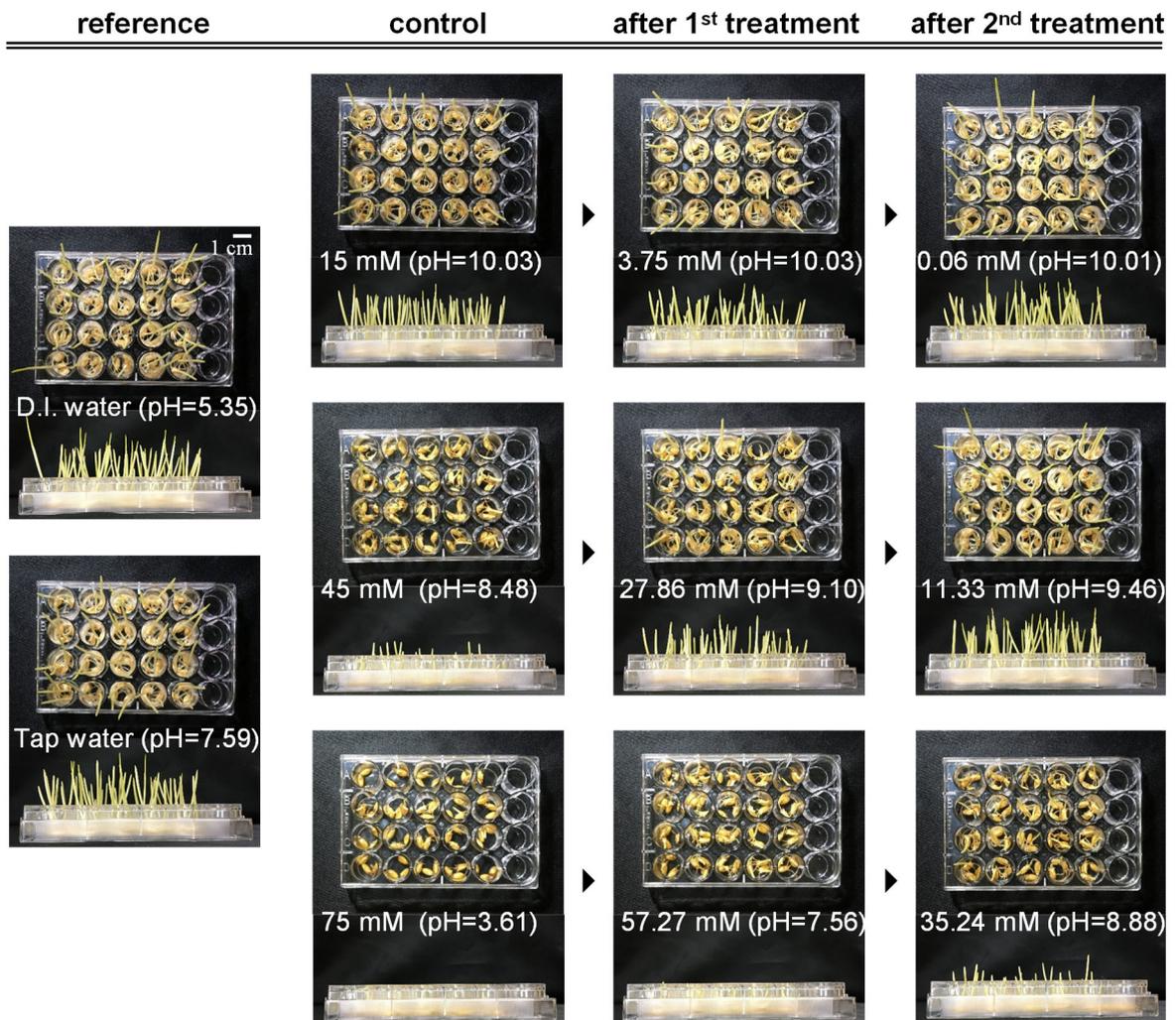
(c)



**Supporting Information Figure 1.** Images of Nafion-films inside the sponge were observed by Field-Emission Scanning Electron Microscope (Sigma, Carl Zeiss, UK). (a) The raw SEM image of Figure 1(ii). The film was colored manually in the manuscript. (b) The zoomed-out SEM images without(left) and with(right) the Nafion coating. (c) Images of energy dispersive X-ray spectroscopy on a Nafion-film. Cracks on the film were created after the incident of the beam. The spectroscopy confirmed that the component of the film was mainly carbon and fluorine which is the main component of Nafion.



**Supporting Information Figure 2.** (a) The cross-section of Nafion film and (b) magnified view of it. The thickness of the film was measured  $\sim 400$  nm.



**Supporting Information Figure 3.** Top/side view of growing wheat seeds in different solutions. 60 wheat seeds were placed in a 24-well plate (3 seeds / a well). Each 24-well plate was assigned by one kind of the solutions. The solutions were deionized water and tap water as reference solutions, three types of alkaline  $\text{NaHCO}_3/\text{Na}_2\text{CO}_3$  solution as control solutions, treated solutions by 1 time and 2 times.

Element	At. No.	Mass (%)	Mass Norm. (%)	Atom (%)	Abs. error (%) (3 sigma)
Carbon	6	31.35	31.35	41.94	14.36
Fluorine	9	68.65	68.65	58.06	26.20
		100.00	100.00	100.00	

**Supporting Information Table 1.** The result of energy dispersive X-ray spectroscopy on the film. Carbon and fluorine were detected in major.