

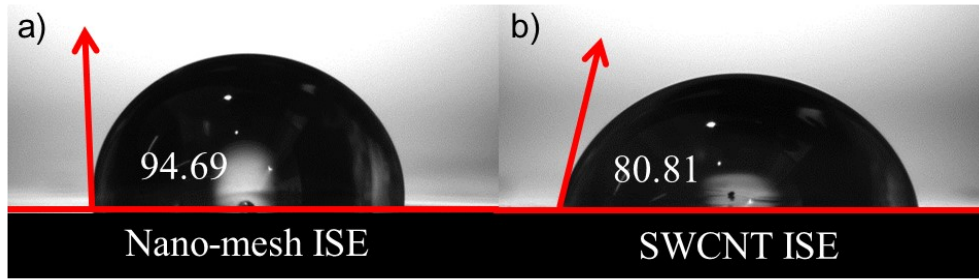
## **Ion Selective Nano-mesh Electrode for Long-term Continuous Monitoring of Wastewater Quality Fabricated Using Template-Guided Membrane Immobilization**

Tianbao Wang,<sup>a</sup> Can Cui,<sup>b</sup> Yuankai Huang,<sup>a</sup> Yingzheng Fan,<sup>a</sup> Zhiheng Xu,<sup>a</sup> Logan Sarge,<sup>a</sup> Christos Bagtzoglou,<sup>a</sup> Christian Brückner,<sup>c</sup> Puxian Gao,<sup>b</sup> Baikun Li\*<sup>a</sup>

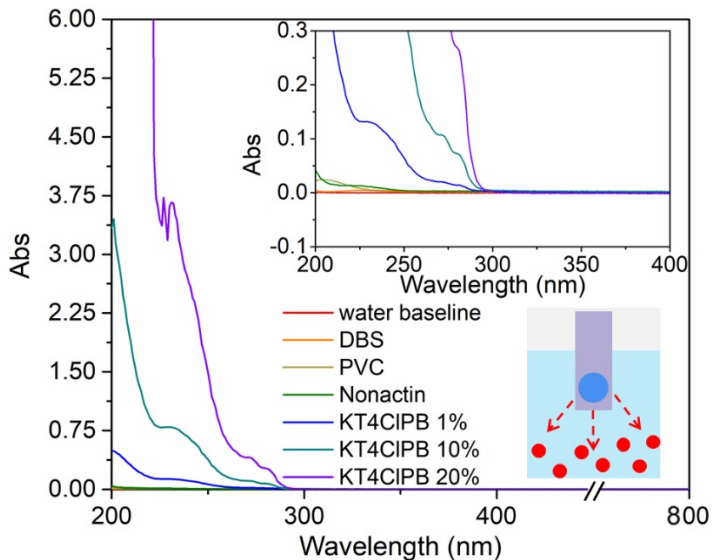
<sup>a</sup> Department of Civil & Environmental Engineering, University of Connecticut, Storrs, Connecticut 06269, United States. Email: [baikun.li@uconn.edu](mailto:baikun.li@uconn.edu)

<sup>b</sup> Department of Materials Science and Engineering, University of Connecticut, Storrs, Connecticut 06269, United States

<sup>c</sup> Department of Chemistry, University of Connecticut, Storrs, Connecticut 06269, United States



**Figure S1.** Contact angle for a) Nano-mesh ISE b) SWCNT ISE with water.



**Figure S2.** Spectra of four sensor matrix components: plasticizer dibutyl sebacate (DBS) only (orange line), PVC only (yellow line), nonactin only (green line), and tetrakis(4-chlorophenyl)borate (KT4CIPB) only (three percentages: 1% (blue line), 10% (cyan line), and 20% (purple line)) from 800 to 200 nm. The inset is an enlarged view of the spectra in the UV region.

### Text S1: Experiment design of the leaching tests:

To quantify the leach out of lipophilic salt and/or Nonactin from  $\text{NH}_4^+$  ISE sensors, groups of sensor samples with each material component were fabricated, including the sensors containing PVC-only solution (supporting polymer), DBS-only solution (plasticizer), Nonactin-only solution (ionophore), and KT4CIPB-only solution (lipophilic salt). The target is to point out that the only component in the sensor material absorbing light at 800-200 nm wavelength is KT4CIPB. Meanwhile, KT4CIPB-only solutions with various concentration of 1%, 10%, 20% were made to further prove that the absorbance of KT4CIPB is positive correlated to the concentration. Then, the constant leaching of KT4CIPB was observed by monitoring the absorbance of a group of S-CNT sensors in 100 days. This process gave us a specific absorbance peak of KT4CIPB (226 nm and 265 nm) under wavelength of 800-200 nm. Besides, this test illustrated that the absorbance peaks don't shift much.

Low absorbance from PVC, plasticizer (DBS), and  $\text{NH}_4^+$  ionophore (nonactin) proved that the only component absorbing light with the wavelength of 200 - 800 nm is KT4CIPB. According to the UV-Vis spectrum of KT4CIPB concentration ranging from 1% to 20%, the absorbance value increased along with the concentration and the absorbance peaks were at around 226 nm and 265 nm of light wavelength.

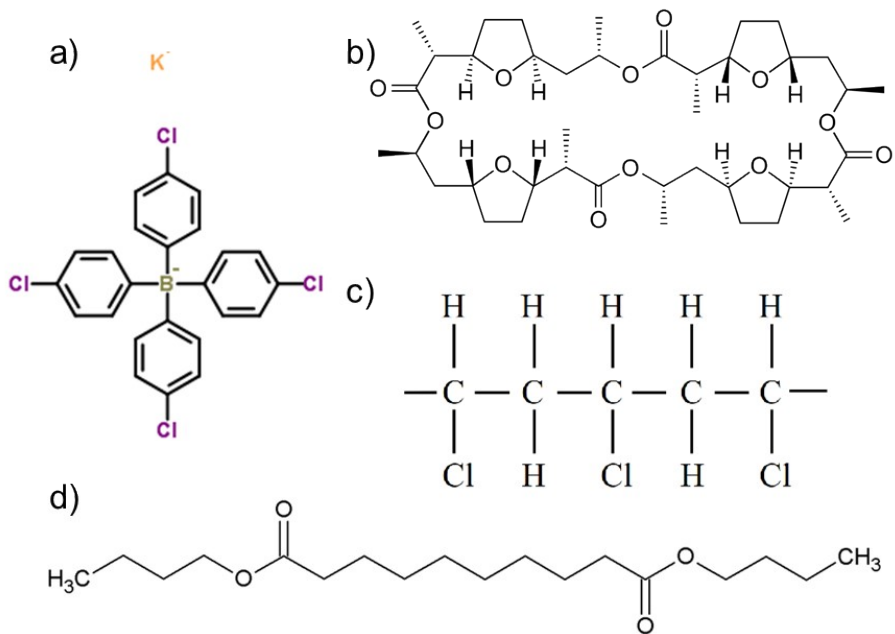


Figure S3. Molecular structure of each component in  $\text{NH}_4^+$  ISE sensor. They are (a) tetrakis(4-chlorophenyl)borate, KT4ClPB; (b) Nonactin; (c) Polyvinyl chloride, PVC; (d) Dibutyl sebacate, DSB