A Pb$^{2+}$ Ionic Gate with Enhanced Stability and Improved Sensitivity

Based on a 4'-aminobenzo-18-crown-6 Modified Funnel-Shaped Nanochannel

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1. Nanochannel preparation

Figure S1. The fabrication process of the funnel-shaped nanochannel by two-step electrochemical etching.
2. The device of ionic current recordings

![Device Diagram](image)

**Figure S2.** The device of ionic current recordings.

3. The characterizations of ionic current recordings

![Current-Voltage Curves](image)

**Figure S3.** The $I-V$ curves of the conical nanochannels at the multifarious states: naked, modified and responsive (10^{-8} M Pb^{2+}).
Figure S4. The comparison with special recognition of the 4-AB18C6 modified funnel-shaped and conical nanochannels immersed into the multicomponent metal ion (Cu$^{2+}$, Co$^{2+}$, Zn$^{2+}$, Ni$^{2+}$, Pb$^{2+}$) through the $I$-$V$ curves. (a) The $I$-$V$ curves of the special recognition of the 4-AB18C6 modified funnel-shaped nanochannels. (b) The $I$-$V$ characterizations of the 4-AB18C6 modified conical nanochannels.

Figure S5. The recyclability of the 4-AB18C6 anchored funnel-shaped nanochannels through the $I$-$V$ curves.
4. Wettability characterization

Figure S6. The contact angle of the varied states.