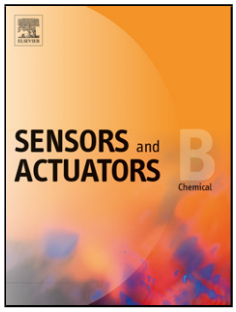

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ppb-Level Heavy Metal Ion Detection by Electrochemistry-Assisted NanoPorous Silicon (ECA-NPS) Photonic Sensors

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Highlights

- Nanoporous silicon (NPS) based 1D microcavity structures are fabricated simply by electrochemical etching, to enhance surface reactions, thus providing high sensitivity.
- The use of the NPS based 1D microcavity structures, in combination with long electrochemical reduction technique, provides a high selectivity and an ultra-low LOD for matters in water.
- This combined technique is applied to detect heavy metal ions (cadmium Cd^{2+} in our particular case) in DI and lake water. The result demonstrates a sensitivity of 342 nm/RIU, and LOD of 0.152 ppb in DI water and 1.16 ppb in lake water. The selectivity of Cd^{2+} is obtained over other metal ions available in the lake water such as sodium (Na^{+}), potassium (K^{+}), magnesium (Mg^{2+}), calcium (Ca^{2+}), nickel (Ni^{2+}).

Abstract