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**Selective passive adsorption of nitrate with surfactant treated porous electrode and electrostatic regeneration** DIEGO I. OYARZUN, ALI HEMMATIFAR, Stanford University, JAMES W. PALKO, UC Merced, MICHAEL STADERMANN, Lawrence Livermore National Lab, JUAN G. SANTIAGO, Stanford University, STANFORD MICROFLUIDICS LAB TEAM, LAWRENCE LIVERMORE NATIONAL LAB TEAM — Nitrate is an important pollutant in drinking water worldwide, and a number of methods exist for the removal of nitrate from water including ion exchange and reverse osmosis. However, these approaches suffer from a variety of disadvantages including the need for a regenerating brine supply and disposal of used brine for ion exchange and low water recovery ratio for reverse osmosis. We are researching and developing a form of capacitive deionization (CDI) for energy efficient desalination and selective removal of ionic toxins from water. In CDI an electrode is used to electrostatically trap ions in a pair of porous electrodes. Here, we demonstrate the use of high surface area activated carbon electrodes functionalized with ion exchange moieties for adsorption of nitrate from aqueous solution. Unlike a traditional ion exchanger, the functionalized surfaces can be repeatedly regenerated by the application of an electrostatic potential which displaces the bound NO3- while leaving an excess of electronic charge on the electrode. Trimethylammonium has an intrinsic selectivity, we are using this moiety to selectively remove nitrate over chloride. We performed adsorption/desorption cycles under several desorption voltages and ratios of concentrations.

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