Rational design of sea urchin-like FeOOH anchored hollow carbon spheres as chloride-insertion electrodes for efficient faradic capacitive deionization

ABSTRACT

Faradic capacitive deionization (FDI) is one of the most promising branches of capacitive deionization (CDI) to relieve global water stress. However, the problems of slow desalination kinetics and poor cycle stability of the anode of FDI have greatly restricted the development of its practical applications. Herein, we put forward a strategy of employing hollow carbon spheres (HCSs) with high specific surface area, and good electrical conductivity/stability as the structural backbone and further decorated it with FeOOH nanorod to construct a 3D sea urchin-like structure (HCSs@FeOOH) as the anode for FDI. Notably, the essence of this design is the structural backbone (HCSs) could not only prevent the structural agglomeration between FeOOH but also provide good electric conductivity to the material system to realize superior pseudo-capacitance. As a result, the HCSs@FeOOH-based FDI system displays excellent desalination performance (desalination capacity and rate up to 69.48 mg g−1 and 0.37 mg g−1 s−1) with good durability (only 14.32 % desalination capacity decrease over 100 cycles), respectively.