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Induced Charge Capacitive Deionization SHIMON RUBIN, MATTHEW SUSS, Technion - Israel Institute of Technology, MAARTEN BIESHEUVEL, Wetsus, European Centre of Excellence for Sustainable Water Technology, MORAN BERCOVICI, Technion - Israel Institute of Technology — We demonstrate the phenomenon of induced-charge capacitive deionization (ICCDI) that occurs around a porous and conducting particle immersed in an electrolyte, under the action of an external electrostatic field. The external electric field induces an electric dipole in the porous particle, leading to capacitive charging of its volume by both cations and anions at opposite poles. This regime is characterized both by a large RC charging time and a small electrochemical charge relaxation time, which leads to rapid and significant deionization of ionic species froma volume which is on the scale of the particle. We show by theory and experiment that the transient response around a cylindrical particle results in spatially non-uniform charging and non-steady growth of depletion regions which emerge around the particle's poles. Potentially, ICCDI can be useful in applications where fast concentration changes of ionic species are required over large volumes.

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