

# Abstract

Carbon-based materials have been developed, characterized and tested for desalination and energy harvesting application. In particular, novel functionalized graphene oxide has been synthesized by steps of reduction and functionalization with charged acrylate monomers (both positive and negative) and mixed with activated carbon to obtain novel capacitive electrodes.

The materials have been fully characterized by scanning electron microscopy, thermogravimetric techniques, infrared spectroscopy, energy dispersive x-ray analysis and other characterization techniques, including electrochemical ones.

These materials have been successfully employed in electrodes used to produce desalinated water through capacitive deionization, showing an improved desalination efficiency. The same materials have also been employed to harvest energy from salinity gradients through capacitive mixing, a novel technique recently proposed in literature.