

# Graphene electrodes for capacitive deionization: an energy efficient water desalination method

**A. Garcia-Luis**

F. Fernández-Carretero, I. Rincón, Y. Belaustegui

TECNALIA

Paseo de Mikeletegui,2 -Donostia-San Sebastián  
(Spain)

[alberto.garcia@tecnalia.com](mailto:alberto.garcia@tecnalia.com)

With 1.8 billion people predicted to live in areas of extreme water scarcity by 2025, desalination—the removal of salt from water—is increasingly being proposed as a solution. Now reverse osmosis (RO) and multistage flash distillation (MSF) are the most common used desalination techniques, but their cost and energy consumption are limiting factors of these technologies. The capacitive deionization (CDI) is an emerging method with reduced use of energy and therefore with lower costs [1].

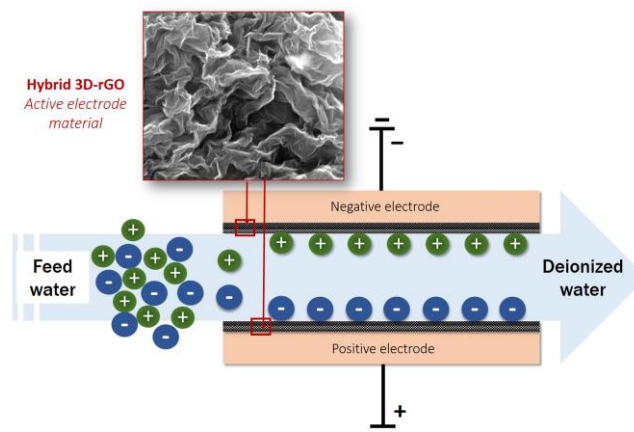
The development at TECNALIA of novel CDI electrodes based in three-dimensional rGO with incorporated metal oxide nanoparticles (rGO/MOx) has led to excellent results of high specific capacitance and good electrosorption capacity. This hybrid RGO/MOx is a promising material to improve the actual CDI technology in order to compete with RO technology for water desalination. Laboratory tests have demonstrated good performance and theoretical estimations of energy consumption are far below the values achieved by the RO technology.

This work has been developed in the framework of the EU Graphene Flagship Project (GA 696656).

## References

- [1] M.E. Suss, S. Porada, X. Sun, P.M. Biesheuvel, J. Yoon and V. Presser, *Energy Environm. Sci.*, 8 (2015) 2296

## Figures



**Figure 1:** CDI desalination technique including 3G-rGO electrodes