Electrocatalyst Materials for Sustainable Energy Conversion

Maria del Carmen Giménez López
Centro Singular de investigación en Química Biolóxica e Materiais Moleculares (CiQUS), Universidade de Santiago de Compostela, 15782 Santiago de Compostela, Spain.

Maria.Gimenez.Lopez@usc.es

Recyclability and re-use of highly active nanocatalysts [1] is still an outstanding global challenge of increasing importance in the area of energy conversion and heterogeneous catalysis.Electrochemical devices based on electrocatalyst materials containing precious metals, such as Pt, are currently hindered by their short-term durability. As these precious elements are rapidly diminishing, the research community is forced to urgently address this major issue until more abundant efficient electrocatalysts are put forward. In this respect, hollow carbon nanostructures can provide an excellent mean for the fabrication of highly durable electrocatalyst materials through nanocatalyst confinement [2,3], allowing their sustainable use in electrochemical processes. These surprising and remarkable properties of the reported hybrid electrocatalyst materials has opened up a new strategy for the sustainable use of precious metals in electrocatalysis and other technological applications that require stabilization of metal nanoparticles under harsh conditions (Figure 1).

REFERENCES

[1] [1] Aygun, M.; Chamberlain, T. W.; Gimenez-Lopez, M. C.*; Khlobystov, A. N.* Advanced Functional Materials, 2018, 28,
[2] 34, 1802869.
[3] [2] Gimenez-Lopez, M.C*; Kurtoglu, A.; Walsh, D.A. ; Khlobystov, A.N. , Advanced Materials, 2016, 28, 41, 9103.
[4] [3] La Torre, A.; Gimenez-Lopez, M.C. *; Fay, M.W.; Lucas, C.H.; Brown, P.D.; Khlobystov, A.N. Small, 2015, 11, 23, 2756.

FIGURES

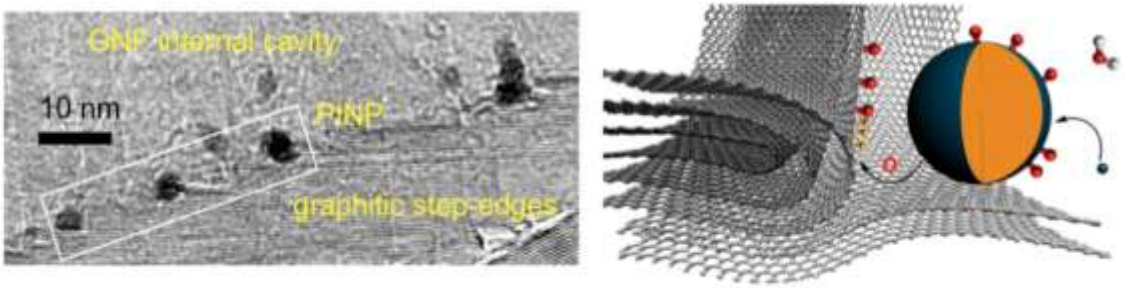

Figure 1: A HRTEM image (left image) and a scheme (righ image) of the internal cavity of a electrocatalytic nanoelectrode with nanoparticles positioned predominantly at the graphitic step-edges.