

The prestigious journal Science invites CIC biomaGUNE researchers to have their articles on nanomaterials published

Maurizio Prato has focused his work on the potential of flexible nanomaterials to create artificial bridges to restore connectivity in spinal cord injuries

Luis Liz Marzán and Marek Grzelczak, both CIC biomaGUNE researchers, explain and define guidelines for future research on growing crystals at the nanoscale

(Donostia-San Sebastián, 16 June 2017). In its two latest editions, the prestigious journal Science has published articles on nanomaterials requested from CIC biomaGUNE researchers Maurizio Prato, Luis Liz Marzán and Marek Grzelczak.

All three researchers have been asked to contribute with Perspective articles, a collaboration model through which the journal invites renowned scientists in a particular area of expertise to put forward ideas to open up new channels to progress in emerging fields.

Maurizio Prato is Head of the Carbon Bionanotechnology Laboratory at CIC biomaGUNE, where he works as an Ikerbasque professor and AXA Foundation Nanobiotechnology Chair. His work has focused on the potential of conductor nanomaterials to create artificial bridges to restore connectivity in spinal cord injuries.

In his article “*Nanomaterials for stimulating nerve growth*”, Prof. Maurizio Prato outlines how new opportunities for regenerating nerve tissue may arise through a combination of different state-of-the-art technologies. The research conducted by Maurizio Prato over the last ten years has been focused on recovery of lesion in spinal tissue after spinal cord injury, a traumatic occurrence affecting thousands of people every year worldwide and causing paralysis attributable to interrupted communication between functional segments of the spinal cord.

To restore connectivity, the team led by Maurizio Prato considers that three-dimensional material made up of carbon nanotubes or nanofibrous graphene-based composites has the potential to behave as electrical nanowires capable of bridging spinal cord segments and opening new horizons in the field of research on restoring spinal cord injury. The authors envisage the use of these materials as core elements inserted into an adaptive supramolecular hydrogel that can mimic the extracellular matrix and support neuron re-growth and stimulation. Similarly, the article adds that the search for solutions in this field must optimally be based on combining these



nanostructures with new generation approaches such as miniaturised electrodes and the support of virtual-reality and robotics.

Luis Liz Marzán, Scientific Director at CIC biomaGUNE, and Marek Grzelczak, both Ikerbasque Research Professors, have addressed the subject of growing crystals at the nanoscale (a nanometre is a millionth of a millimetre). At that scale, properties of materials may radically change when their size and/or geometry are modified, so knowledge of, and control over, anisotropic (in a particular direction) growth is of particular interest. The physical and chemical properties of these anisotropic nanocrystals can be applied in various fields, particularly biomedicine. Under the title “*Growing anisotropic crystals at the nanoscale*”, the authors put forward a series of guidelines to be developed to continue recent research conducted by themselves on colloidal synthesis of different-shaped gold nanoparticles.

In this case, the research professors’ Perspective article addresses the challenge of simplifying and mainstreaming the current synthetic methods to improve the reproducibility of these crystals. To do so, they propose developing more advanced characterisation techniques, using electron microscopes for in-situ monitoring of the growth of nanocrystals, and take further steps forward in relation to the importance of computational methods to predict the growth and properties of nanoparticles.

These research studies have been funded by the AXA Foundation, the European Research Council and the Spanish Ministry of Economy, Industry and Competitiveness.

About CIC biomaGUNE

Since it was founded in 2006, CIC biomaGUNE has established itself as a nationally and internationally recognised leader in the field of science and as a knowledge builder in the field of biomaterials. Amongst other achievements, this has led to the generation of new knowledge (publications, patents, etc.), collaboration with international bodies and institutions and to its technological equipment and scientific personnel being at the service of the scientific community and business fabric.