

Friday, 19th July, 12.00 pm, Seminar Room

Host: Dr. Maurizio Prato

From Aqueous Graphene Dispersions to Smart Soft Materials

Ester Vázquez

Universidad de Castilla-La Mancha. Instituto Regional de Investigación Científica Aplicada (IRICA) 13071 Ciudad Real, Spain

Ester.vazquez@uclm.es

The synthesis of different soft hydrophilic polymeric networks, by in situ radical polymerization in the presence of graphene derivatives, is one of the followed approaches to attain three-dimensional nanocomposite scaffolds. The role of the nanomaterial within the polymer network is primarily intended for the reinforcing (i.e. increasing the stiffness and toughness). However, we have shown that the presence of graphene can also enhance features such as biocompatibility [1], smart behavior based on responsiveness to external stimuli [2], sensing [3], or self-healing ability, giving rise to truly hybrid composites [4].

The preparation of these soft materials requires the production of large amounts of graphene derivatives in water, and for this reason, ball milling approaches developed in our labs, have proven a method of choice for the preparation of graphene starting dispersions [5]. Moreover, aqueous graphene suspensions can be rapidly frozen and, subsequently, lyophilized giving rise to a very soft and low-density black powder which can be readily dispersed in culture media allowing studies of so-prepared solutions with cells [6].



References

- [1] C. Martín, S. Merino, J. M. González-Domínguez, R. Rauti, L. Ballerini, M. Prato, E. Vázquez, *Scientific Reports*, 2017, 7, 10942.
- [2] J. M. González-Domínguez, C. Martín, O. J. Durá, S. Merino, E. Vázquez. *ACS Appl. Mater. Interfaces*, 2018, 10, 1987.
- [3] A. Martín-Pacheco, A. Esaú Del Río Castillo, C. Martín, M. A. Herrero, S. Merino, J. L. García Fierro, E. Díez-Barra and E. Vázquez, *ACS Appl. Mater. Interfaces*, 2018, 10, 18192.
- [4] C. Martín, A. Martín-Pacheco, A. Naranjo, A. Criado, S. Merino, E. Díez-Barra, M. A. Herrero, E. Vázquez, *Nanoscale*, 2019, 11, 4822.
- [5] J. M. González-Domínguez, V. León, M. I. Lucío, M. Prato and E. Vázquez. *Nature Protocols*, 2018, 13, 495.
- [6] J. G. Reina, J. M. Gonzalez-Domínguez, A. Criado, E. Vazquez, M. Prato, A. Bianco. *Chem. Soc. Rev.* 2017, 46, 4400.