

12 сентября 2019 г. в 17.00 в зале Научного совета ПСПБГМУ им. акад. И.П. Павлова (ул. Льва Толстого д. 6-8Б, корп. 2) состоится совместный научный семинар кафедры общей и биоорганической химии и кафедры биологической химии на тему «Nano–Enhanced Phase Change Materials Based on PEG400 for Thermal Applications».

Abstract

Energy storage is considered one of the key technologies to overcome the intermittency of several renewable sources such as solar energy and promote the development of environmentally friendly thermal facilities [1]. Among the different ways to store thermal energy, phase change materials (PCMs) are particularly interesting since such materials allow large densities of energy storage at a nearly constant temperature. Polymers such as poly(ethylene glycol)s, PEGs, have been proposed as promising candidates to store thermal energy throughout solid–liquid transitions [2]. However, like most organic PCMs, poly(ethylene glycol)s show low thermal conductivities. This feature may become a limitation for practical application, since a low thermal conductivity reduces heat transfer and, consequently, prolongs the capture/release of stored energy. The dispersion of particles with nano–metric size and high thermal conductivity has proven as an effective strategy to face this limitation [3]. These advanced PCMs are known as nano–enhanced phase change materials or nano-PCMs in specialized literature.

This presentation aims to discuss some advances in the design and thermophysical characterization of nano–enhanced phase change materials formulated as dispersions of different metallic [4,5] or carbon nanostructures [1,6] in a poly(ethylene glycol) PEG-400.

- [1] M.A. Marcos, D. Cabaleiro, M.J.G. Guimarey, M.J.P. Comuñas, L. Fedele, J. Fernández, L. Lugo. *Nanomaterials*, 8, **2018**, 16.
- [2] K. Pielichowska, K. Pielichowski, *Prog. Mater. Sci.* 65, **2014**, 67–123.
- [3] Z. Ma, W.L.M. Imroz Sohel, *Renew. Sust. Energ. Rev.* 58, **2016**, 1256–1268.
- [4] M.A. Marcos, D. Cabaleiro, L. Fedele, S. Bobbo, L. Lugo, Silver dispersions in poly(ethylene glycol) as novel NePCMs for thermal energy storage, *1st International Conference on Nanofluids (ICNf2019)*, 26–28 June 2019, Castelló, Spain.
- [5] M.A. Marcos, M. Testa, D. Cabaleiro, V. Salgueiriño, L. Lugo, Silica-gold core-nanoparticle dispersions in PEG400 as stable phase change materials for thermal energy storage, *NanoUptake Cost Action (CA15119) Working Group Meeting*, 25-29 May **2018**, Naples, Italy.
- [6] M.A. Marcos, N.E. Podolsky, D. Cabaleiro, L. Lugo, A.O. Zakharov, V.N. Postnov, N.A. Charykov, S.V. Ageev, K.N. Semenov, *J. Mol. Liq.* 294, **2019**, 111616.

David Cabaleiro is a recipient of a postdoctoral fellowship from Xunta de Galicia (Spain) at the Department of Applied Physics (University of Vigo, Spain). His research career has mainly focused on the design and/or thermophysical characterization of conventional heat transfer fluids and nano-structured thermal media. He is co-author of 31 articles published in journals listed in the ISI Web of Science and more than 40 communications to national or international conferences. He has taken part in different industrial and academic research projects and collaborated in several prestigious research centers such as the Institute of Construction Technologies (National Research Council, Italy), Laboratoire de Génie Civil et Génie Mécanique (Université Rennes, France) or Department of Physics and Medical Engineering (Rzeszow University of



Technology, Poland). His research interests include nanofluids, PCM nano-emulsions, nano-enhanced PCMs, thermal properties, rheological behavior and heat transfer performance.