

MASTER


  
**CHEM**
  
 BIO&MAT

 CHEMISTRY
   
*at the Interface with*
  
 BIOLOGY and
   
 MATERIALS Science
**July 17 - 18, 2023**

CiQUS · Santiago de Compostela

**Monday July 17, 2023****17.30 - 19.30 h | Poster Session**

Location: CiQUS, Outside Terrace in front of CiTIUS Building

**Tuesday July 18, 2023****11.30 h | Closing Lecture**

Location: CiQUS Seminar Room (Ground Floor)

**Invited Speaker: Prof. M. Carmen Galán**

School of Chemistry, University of Bristol, BS9 4PU, UK

<https://www.galanresearch.com/>

*M. Carmen Galan is a Professor of Organic and Biological Chemistry in the School of Chemistry at the University of Bristol. In 2017, she was awarded the RSC Dextra Carbohydrate Chemistry award in recognition of her research into new synthetic methodologies for oligosaccharide synthesis and the development of novel glycoconjugate probes. In 2021 she received the RSC Jeremy Knowles award for the development of bioinspired synthetic probes for the targeting and regulation of cellular processes and in 2022 she was awarded the SRUK Merit award for her contributions to science and the impact of her work to the wider community. Carmen received her Ph.D. in Organic Chemistry from the Complex Carbohydrate Research Center at The University of Georgia, USA, under the supervision of Prof. Geert-Jan Boons. She then moved to California to pursue post-doctoral research with Prof. Chi-Huey Wong at The Scripps Research Institute and M.I.T with Prof. Sarah O'Connor before moving to the UK in 2006 as a Lecturer.*

## Glycan-based fluorescent nanomaterials: from diagnostic to theranostic applications

O-Glycosylation is a ubiquitous post-translational modification that is highly dynamic and responsive to cellular stimuli through the action of the cycling enzymes. Expression of specific O-glycans is linked to changes in gene expression in, for example, inflammatory bowel disease, cystic fibrosis and several types of cancer.<sup>1</sup> Glycan coated-nanoparticles constitute a good bio-mimetic model of carbohydrate presentation at the cell surface and provide a powerful tool to screen for protein carbohydrate interactions and consequently for the identification of carbohydrate receptors or ligands associated with many inter- and intracellular recognition processes associated to disease. In order to develop and use these glyco-tools for biomedical applications, it is of the utmost importance to have access to structurally defined oligosaccharide-based probes.

In recent years, our group has developed fluorescent multivalent O-glycan probes for the screening of O-glycosylation-linked interactions in live cells and more recently in bacteria. In this tutorial, we will discuss our more recent results on the synthesis of a range of nanoprobe and their potential applications as diagnostic tools and drug delivery systems.<sup>2</sup>

(1) M. C. Galan\*, D. Benito-Alifonso and G. M. Watt. Carbohydrate Chemistry in Drug Discovery. Org. Biomol. Chem. (2011), 9 (10), 3598 - 3610.

(2) a) Benito-Alifonso, D.; Tremel, S.; Hou, B.; Lockyear, H.; Mantell, J.; Fermin, D. J.; Verkade, P.; Berry, M.; Galan, M. C. *Angew Chem Int Edit* **2014**, *53*, 810. b) S. A. Hill, D. Benito-Alifonso, D.J. Morgan, S.A. Davis, M. Berry, M. C. Galan\* *Nanoscale* **2016**, *8*, 18630. c) D. Benito-Alifonso, B. Richichi, V. Baldoneschi, M. Berry, M. Fragai, G. Salerno, M. C. Galan,\* and C. Nativi\* *ACS Omega* **2018**, *3*, 9822. d) S. A. Hill, D. Benito-Alifonso, S. A. Davis, D. J. Morgan, M. Berry, and M. C. Galan\* *Scientific Reports*, **2018**, *8*, 12234. e) T. A. Swift, M. Duchi, S. A. Hill, D. Benito-Alifonso, R. L. Harniman, S. Sheikh, S. A. Davis, A. M. Seddon, H. M. Whitney, M. C. Galan\* and T. A. A. Oliver\*. *Nanoscale*, **2018**, *10*, 13908. f) S.A. Hill, S. Sheikh, Q. Zhang, L. Sueiro Ballesteros, A. Herman, S. A. Davies, D. J. Morgan, M. Berry, D. Benito-Alifonso, M. C. Galan\*. *Nanoscale Adv.* **2019**, *1*, 2840-2846. g) *Nanoscale Advances*, **2022**, *4*, 1770.

*This event is part of the "Tutored Training Activities" at the Master in Chemistry at the Interfaces with Biology and Materials Science and it is open to the whole CiQUS community and the rest of the USC members*