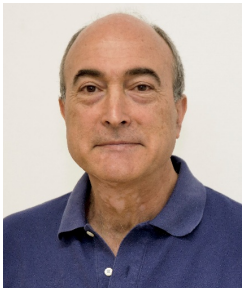
Closing Lecture:
Carbon Nanostructures for Emergent Viruses: Ebola and beyond



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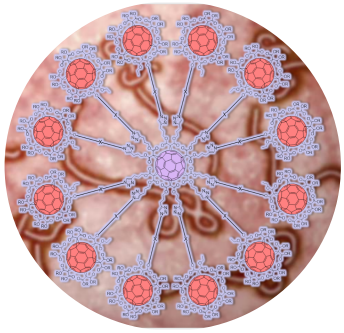

Abstract: The supramolecular interaction carbohydrate-protein is ubiquitous in a large variety of biological processes. In order to design multivalent peripheral ligands with glycomimetic properties that structurally can attach to the receptor sites of complex biological structures, a broad variety of ''artificial glycoforms'' have been created with the aim of understanding the mechanisms involved in multivalent binding interactions.

A variety of different chemical and bio-inspired scaffolds have previously been used in the search for new glycoconjugates bearing the carbohydrates located in the appropriate spatial arrangement. Actually, there are many examples where multivalency drastically enhances the interactions between biomolecules in comparison to the analogous monovalent binding.

In this regard, we have recently shown that *hexakis-adducts* of [60]fullerene endowed with 12, 24 or 36 mannoses, act as strong inhibitors for DC-SIGN in an Ebola infection assay model.[1] Furthermore, a drastic increase in the inhibition process at the subnanomolar scale has been observed when the size and mannoses´ number are increased in the firstly reported tridecafullerenes endowed with 120 mannose units decorating the periphery of the molecule.[2]

From the work carried out by our group on glycofullerenes with globular symmetry, it is possible to bring to light the significance of size and shape of the glycomimetic, being even more determinant that the number of carbohydrate moieties in the glycoparticle. Furthermore, the synthetic approach is simplified, using C_{60} *mono-adducts* instead of C_{60} *hexakis-adducts*, without compromising the spherical form of the final glycomimetic, provided by the supramolecular aggregate resulting from the self-assembly of mono-adducts.[3] The efficiency to block DC-SIGN mediated viral infection by an artificial Ebola virus has been tested in a cellular experimental assay finding that, these systems are potent inhibitors of viral infection.

In this presentation, a variety of carbon nanostructures endowed with sugars (sugar-balls) will show their effect for inhibiting infection by emergent viruses, namely Ebola, Zika and Dengue and, by modifying the organic addend molecules, other virus like VIH.[4]

References

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[ONLINE] - Zoom
February 5, 2021
11:00 am

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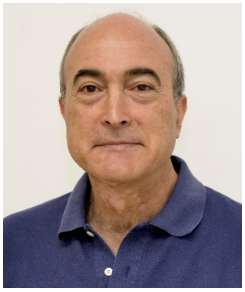

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Biography: Nazario Martín is full professor of Organic Chemistry at the University Complutense of Madrid and vice-Director of the Institute for Advanced Studies in Nanoscience of Madrid (IMDEA-Nanoscience). Dr. h.c. by La Havana University (Cuba) and Castilla La Mancha University (Spain), Professor Martín's research interests span a range of targets with emphasis on the molecular and supramolecular chemistry of carbon nanostructures such as fullerenes, carbon nanotubes and graphene, pi-conjugated systems as molecular wires and electroactive molecules, in the context of chirality, electron transfer processes, photovoltaic applications and nanoscience. He has published around 600 papers in peer reviewed journals, given around 450 lectures in scientific meetings and research institutions, and supervised 46 theses (Ih = 79). He has co-edited 6 books related with carbon nanostructures and he has been invited as guest editor for 14 special issues in well-known international journals. Professor Martín has been visiting professor at UCSB and UCLA (California, USA) and Angers and Strasbourg (France) universities. He has served as a member of the Editorial Board in a wide variety of top scientific journals. In 2015-2019, he was the Editor-in-Chief of The Journal of Materials Chemistry of the RSC, UK. He is a correspondent member of the Royal Academy of Doctors of Spain (2006) and the Royal Academy of Sciences of Spain (2015), as well as a Fellow of The Royal Society of Chemistry. In 2006-2012 he has been the President of the Spanish Royal Society of Chemistry. He has been the recipient of the "Dupont Prize of Science" in 2007 and of the "Gold Medal and Research Award" in 2012, the highest distinction given by the Spanish Royal Society of Chemistry. He has been appointed with the Spanish national "Jaime I Award for basic research" 2012 (received from her Majesty, The Queen), and the recipient of the "Alexander von Humboldt Award" (Germany) and "Richard E. Smalley Research Award" (USA) in 2013. He has been distinguished with the "EuCheMS Lecture Award" in 2012. He has received the "Catalán-Sabatier" award from the French Chemical Society in 2014, the prestigious "Miguel Catalán" award from the Madrid Community in 2015 and the "Elhuyar-Goldsmith" award from the German Chemical Society (GDCh) in 2016. In 2018 he was appointed as a Chemistry Europe Fellow (Wiley), and he has been awarded with the Ciamician-González lectureship given by the Italian Chemical Society in 2019. He has been the first elected President of the Confederation of Scientific Societies of Spain (COSCE) in 2015-2019. This organization is formed by about 80 scientific societies with over 40.000 scientists, thus being the most important in Spain. In 2012 he received the "Advanced Grant" of the European Research Council (ERC) entitled "Chirallcarbon". More recently, he has been granted with the Synergy-ERC project "Tomatto" as well as the most prestigious Spanish National Award in Chemistry "Enrique Moles" given by the Spanish Ministry for Science and Innovation (MICINN), both in 2020.

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