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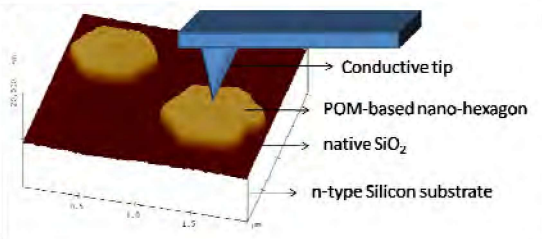
ATTI DEL CONGRESSO

FIS-OR-04 Capacitive effects in silicon-supported polyoxometalate-based nanocrystals

Chiara Musumeci,[a] Mali Husby Rosnes,[b] Filippo Giannazzo,[c] Leroy Cronin[b,*] and Bruno Pignataro[d,*]

[a]Superlab-Consorzio Catania Ricerche, S.le Primosole 50, 95121 Catania, Italy. [b]Department of Chemistry, WestCHEM, University of Glasgow, Glasgow, G12 8QQ, United Kingdom, *Lee.Cronin@glasgow.ac.uk*
[c]CNR-IMM, Strada VIII, 5, Zona Industriale, 95121, Catania, Italy.
[d]Dipartimento di Chimica "S. Cannizzaro", Università di Palermo, V.le delle Scienze -90128 Palermo, Italy, *bruno.pignataro@unipa.it*

Polyoxometalates (POMs) are complex metal oxide molecules, which have attracted growing interest, due to their wide potential redox, photochemical and catalytic properties. The potentiality for these compounds to be applied in functional devices has shown the need of investigating their assembly and organization in the solid state and on solid substrates. On this respect, we recently showed the possibility to form at solid surfaces a large landscape of supramolecular architectures by employing derivatized POMs under both static and dynamic self-assembly conditions. [1,2] By using Langmuir-Blodgett, here we show that the symmetric C9-alkenes derivatized Mn-Anderson clusters give in combination with dioctadecyldimethylammonium (DMDOA) counter-ions well-defined 2D hexagonal nanostructures at silicon surfaces. Such an organization derives by a nucleation and growth process involving the hopping of DMDOA on top of C9-Mn-Anderson upon barrier compression. We report on the hexagonal nanostructures as effective nanodielectrics, their nanoscale capacitive properties having been measured by scanning capacitance microscopy. Noteworthy, the dielectric properties of these nanoscale structures can be modulated upon the applied bias to the scanning tip. These findings open fascinating perspectives that these novel supramolecular assembly may give in emerging scientific and technological fields including their application as smart materials in plastic and/or hybrid (organic-inorganic) electronics.



[1] M.H. Rosnes, C. Musumeci, C.P. Pradeep, J.S. Mathieson, D.L. Long, B. Pignataro, R. Cogdell, L. Cronin, *J. Am. Chem. Soc. (Communication)*, 132 **2010** 15490.
[2] C. Musumeci, A. Luzio, C.P. Pradeep, H.N. Miras, M.H. Rosnes, Y.F. Song, D.L. Long, L. Cronin, B. Pignataro, *J. Phys. Chem. C 115* **2011** 4446.