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# Long-lived charged states in porphyrin nanoribbons

Edmund Leary,[a,b,c] Georg Kastlunger,[d,e] Bart Limburg,[f] Laura Rincón-García,[g] Juan Hurtado-Gallego,[g] M. Teresa González,[a] Gabino Rubio Bollinger,[g,h] Nicolás Agrait,[a,g,h] Simon J. Higgins,[b] Harry L. Anderson,[f] Robert Stadler[i] and Richard J. Nichols.[b,c]

[a] *Fundación IMDEA Nanociencia, Calle Faraday 9, Campus Universitario de Cantoblanco, 28049 Madrid, Spain. E-mail: edmund.leary@imdea.org*

[b] *Department of Chemistry, University of Liverpool, Liverpool L69 7ZD, UK*

[c] *Surface Science Research Centre, University of Liverpool, Oxford Street, Liverpool L69 3BX, UK*

[d] *School of Engineering, Brown University, 02912 Providence (RI), USA*

[e] *Department of Physics, Technical University of Denmark (DTU), Fysikvej, 2800 Lyngby, Denmark*

[f] *Department of Chemistry, Chemistry Research Laboratory, Oxford University, Oxford OX1 3TA, UK*

[g] *Departamento de Física de la Materia Condensada, Universidad Autónoma de Madrid, E-28049, Madrid, Spain*

[h] *IFIMAC and Instituto ''Nicolás Cabrera'', Universidad Autónoma de Madrid, Madrid, E-28049, Spain*

[i] *Institute for Theoretical Physics, TU Wien-Vienna University of Technology, Wiedner Hauptstrasse 8-10, A-1040 Vienna, Austria.*

Abstract:

We will demonstrate that sub-5 nm porphyrin nanoribbons[1] can be charged inside two-terminal single molecule junctions in which the charged state can persist for many seconds under ambient conditions.[2] This phenomenon is possible due to the presence of a localized molecular eigenstate close to the Fermi edge of the electrodes which can be accessed by applying a moderately high bias voltage of about 1.0 V. Upon charging, the low-bias molecular conductance is boosted by approximately two orders of magnitude which gives rise to a hysteretic *I-V* response. This opens the door to the tantalizing possibility that these long-lived charged states may lead to memristor architectures or redox-based molecular memories in future two-terminal devices. The ambient operation highlights that special environments, low temperatures or ultra-high vacuum conditions are not prerequisites for stable charged molecular junctions.

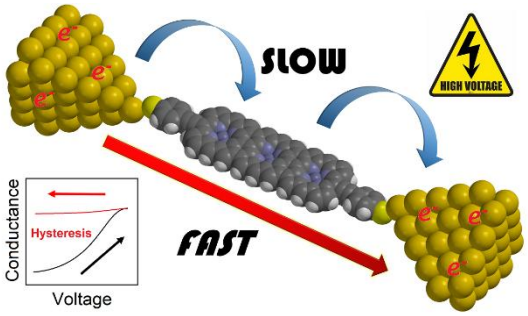


*Figure 1. Schematic demonstrating the two channel mechanism of charge transport in porphyrin nanoribbons.*

References:

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(2) Leary, E.; Kastlunger, G.; Limburg, B.; Rincón-García, L.; Hurtado-Gallego, J.; González, M. T.; Bollinger, G. R.; Agrait, N.; Higgins, S. J.; Anderson, H. L.; Stadler, R.; Nichols, R. J. Long-Lived Charged States of Single Porphyrin-Tape Junctions under Ambient Conditions. *Nanoscale Horiz* **2021**, *6* (1), 49–58.