SPIC 2025 : Cinquième congrès national Sciences et Technologies des systèmes pi-conjugués
20-23 Janv. 2025, Paris 75013 (France)

SMALL, CHIRAL AND SELF-ASSEMBLED: THE NEW RECIPE FOR ORGANIC ELECTRONICS

Amparo Ruiz-Carretero*

University of Strasbourg, Institute Charles Sadron (CNRS), Strasbourg, France
* amparo.ruiz@ics-cnrs.unistra.fr

Providing global energy supply in a sustainable manner is one of the main challenges of our generation. We are therefore, in the urge to find alternative resources and materials. In this sense, organic materials are the best candidates to fabricate electronic devices since we can tailor their properties by molecular design. They have other advantages such as flexibility, light weight, portability and scalability. Still, the efficiency of organic devices is far from the one of inorganic materials or perovskites. Despite the progress made in the field, the race for achieving efficiency records, has hampered research focused on solving other fundamental issues, such as device morphology and charge recombination. In this talk, I will show different strategies to demonstrate how noncovalent interactions can enhance charge transport and device efficiency in organic electronic devices.[1] In our group we incorporate hydrogen bonds to extraordinarily small semiconductors to enhance charge carrier mobility and lifetime, [2,3] and introduce chiral centers to explore the Chiral Induced Spin Selectivity (CISS) effect to decrease charge recombination.[4] The synthesis, self-assembly and optical properties will be shown and correlated to the charge transport results obtained by using electrodeless techniques and full devices. The spin selectivity results explored by scanning tunnel microscopy (STM) on spectroscopy mode (STS), show how it is possible to guide charge carriers through opposite chirality supramolecular structures.[4]

Références

[1]T. Aytun, L. Barreda, A. Ruiz-Carretero, J. A. Lehrman, S. I. Stupp. *Chem. Mater*. **2015**, 27, 1201-1209. R. Gonzalez, G. Martinez, N. R. Avila-Rovelo, K. Hong, A. Ruiz-Carretero, R. Ponce Ortiz. J. *Mater. Chem. C* **2024**, *12*, 18264

[2]N. R. Avila-Rovelo, G. Martinez, W. Matsuda, S. Sinn, P. Leveque, D. Schwaller, P. Mesini, S. Seki, A. Ruiz-Carretero. *J. Phys. Chem. C* **2022**, 126, 10932

[3]S. Militzer, N. Nishimura, N. A. Avila-Rovelo, W. Matsuda, D. Schwaller, P. J. Mesini, S. Seki. A. Ruiz-Carretero. *Chem. Eur. J*. **2020**, 26, 9998-10004. A. M. Garcia, A. Ruiz-Carretero. *Chem. Commun*. **2022**, 4, 529.

[4]A. M. Garcia, G. Martinez, A. Ruiz-Carretero. *Frontiers in Chemistry* **2021**, doi.org/10.3389/fchem.2021.722727. K. Hong, A. Kumar, A. M. Garcia, S. Majumder, A. Ruiz-Carretero. *J. Chem. Phys*. **2023**, *159*, 114903.