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EDITORIAL

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Emerging organic electronics

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Smartphone and tablet displays, portable solar devices, curved TV screens and sensors are some examples of current industrial applications of organic electronics. Organic electronics consists of the application of organic (carbon-based) molecules and polymers with suitable optical and electronic properties in optoelectronic devices. Although these materials often have lower performance than competing inorganic derivatives, they exhibit unusual properties that make them really appealing candidates, such as:

– Flexibility thanks to their plastic mechanical properties;

– Low amount of material requirement due to their high absorption and emissive properties;

– Low production costs due to their solution processability;

– Adaptability by the easy adjustment of their properties by chemistry.

In the short term, it is expected that these organic semiconductors will find new and additional applications in bioelectronics, wide-screen displays, waste heat recovery through thermoelectric devices, sensors for IoT, bioimaging, *etc.*

Given the complexity of the development of such applications, multidisciplinarity appears to be a solid and necessary cornerstone. Indeed, the complementarity between chemistry and physics is at the origin of the emergence of organic electronic technologies. Its two pillars, molecular design and device engineering, have allowed the community to reach more and more efficient electronic devices over the years.

This themed collection focuses specifically on this complementarity.

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Zuo-Quan Jiang

Zuo-Quan Jiang completed his PhD studies at Wuhan University in 2009, then continued his postdoc research at the University of Washington and City University of Hong Kong for two years. He joined Soochow University, Institute of Functional Nano & Soft Materials (FUNSOM), as Associate Professor in 2011, and was promoted to full Professor in 2017. During 2015–2016, he was a visiting Professor at the Georgia Institute of Technology. His research focuses on new conjugated molecules and organic functional materials.

Cyril Poriel

Cyril Poriel is a CNRS Research Director at "Institut des Sciences Chimiques de Rennes" – UMR 6226 (Rennes 1 University, France). His main research interest deals with the design of π-conjugated molecular architectures for organic electronics. He is interested in the design of blue emitting fluorophores for organic light-emitting diodes (OLEDs), high triplet host materials for phosphorescent OLEDs, TADF OLEDs, electron-deficient semiconductors for n-type organic field-effect transistors and, more recently, nanorings chemistry.

Mario Leclerc and collaborators describe an example of chemical route optimization towards advanced fluorinated polymers for charge transport applications (DOI: 10.1039/D0QM00218F). Independently, Gregory C. Welch (DOI: 10.1039/D0QM00109K), Alex K.-Y. Jen (DOI: 10.1039/D0QM00016G), Derya Baran (DOI: 10.1039/C9QM00605B) and their respective collaborators show how the design of non-fullerene small molecules could affect organic photovoltaic device performances through the adjustment of absorption properties, dipole moment and charge transport properties, respectively. Seth R. Marder *et al.* demonstrate the relationship between exciton energy and the width of the organic cation in a series of perovskites (DOI: 10.1039/D0QM00118J). Emissive organic materials are also well addressed through the development of extended multiple resonance TADF emitters by Eli Zysman-Colman and coworkers (DOI: 10.1039/D0QM00190B) and through the investigation of exciplex systems by Ken-Tsung Wong's team (DOI: 10.1039/D0QM00188K) and the Liang-Sheng Liao group (DOI: 10.1039/D0QM00116C), respectively. New applications of emissive materials are also demonstrated in the investigations of mechanochromic properties of complex molecules by Philippe Gerbier *et al.* (DOI: 10.1039/D0QM00087F) and of aggregation induced emission organic molecules by Chuluo Yang's team (DOI: 10.1039/D0QM00247J). Optical properties are also investigated by Christian B. Nielsen and Zachary S. Parr in a series of conjugated molecules for cation detection (DOI: 10.1039/D0QM00157K) and by Christos L. Chochos and coworkers for bioimaging applications of conjugated polymer nanoparticles (DOI: 10.1039/D0QM00195C). Anne Hébraud and coworkers rightly describe the state of the art of conjugated polymer nanoparticle elaboration for greener organic photovoltaic cell processes (DOI: 10.1039/D0QM00361A). Martin Brinkmann illustrates the strong relationship between polymer chemical structure and solid-state structure with an emphasis on highly oriented and crystalline thin films (DOI: 10.1039/D0QM00230E). A rare example of organic semiconducting molecule used as down converter on top of a GaN-based LED, has been provided by Graeme Cooke and coworkers (DOI: 10.1039/C9QM00771G). Finally, Jean-Pierre Simonato *et al.* describe the fabrication of printed thermoelectric generators through an innovative spray-coating process (DOI: 10.1039/D0QM00265H).

We would like to express our sincere gratitude to all the authors for their valuable contributions to this themed collection. Please enjoy reading.

Nicolas Leclerc

Nicolas Leclerc received his PhD from the Pierre and Marie Curie University (Paris, France) in 2003. After completing his post-doctoral research at Laval University in Mario Leclerc's team (Canada), he joined the Institute of Chemistry and Processes for Energy, Environment and Health (ICPEES) of the University of Strasbourg (France) as a CNRS researcher in 2005. His research interests focus on the development of new molecular and macromolecular organic semiconductor materials and their applications in optoelectronics, mainly in the fields of photovoltaics and thermoelectrics.

