

# IRG PHENICS ON-GOING COLLABORATION

Title of the collaboration: Multifunctional organic electronics devices incorporating photoswitchable elements

COUNTRY A:	FR	COUNTRY B:	DE
Name of group/Institution:	Nanochemistry Lab, ISIS	Name of group/Institution:	LOCFM, HU Berlin
Name:	P. Samorì	Name:	S. Hecht
Other participants:	E. Orgiu	Other participants:	
Role in the collaboration:	Device fabrication and testing	Role in the collaboration:	Synthesis of photoswitchable molecules
Name of group/Institution:		Name of group/Institution:	
Name:		Name:	
Other participants:		Other participants:	
Role in the collaboration:		Role in the collaboration:	

Background, objectives, results:	Figure:
<p>Our aim is not only to achieve improved device performance in organic electronics, but also to confer a multifunctional nature to the materials employed, allowing for organic-based logic applications. We have conducted studies on the engineering of the electronic structure in a semiconducting film by blending two molecular components, a <u>photochromic diarylethene (DAE) derivative</u> and a poly(3-hexylthiophene) (P3HT) matrix, to attain phototunable and bistable energy levels for the P3HT's hole transport.</p>	<p>The figure illustrates the chemical structures of P3HT and various DAE photochromic molecules. P3HT is shown as a polymer chain with hexyl side chains. The DAE molecules are shown in two states: a closed state (DAE_1a, DAE_2a) and an open state (DAE_1c, DAE_2c). The transition from the closed to the open state is induced by UV light, and the reverse transition is induced by visible light (vis). The device structure is shown as a cross-section of a thin film on a substrate, with layers labeled: DAE-P3HT (semiconductor), Au (source and drain), SiO<sub>2</sub> (dielectric), and n<sup>++</sup> Si (substrate).</p>

Common publications, communications, bilateral funding, invitation funding, cotutoring of students, ...:

- E. Orgiu, N. Crivillers, M. Herder, L. Grubert, M. Pätzel, J. Frisch, E. Pavlica, G. Bratina, N. Koch, S. Hecht, and P. Samorì, *Nat. Chem.* **2012**, *4*, 675-679.