

<b>Title</b>	<b>Functional nanomaterials and their implementation in electronic devices</b>
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### Project description:

Among the bottom-up approaches, on-surface synthesis (OSS) of organic compounds is one of the most promising. The synergy of ultra-high vacuum (UHV) deposition and thermal or optical stimuli leads to superior control of many building blocks such as fullerene, phthalocyanines, porphyrins, poly(p-phenylene), etc. Their supramolecular organization has been successfully demonstrated onto different substrates (viz. silver, gold, HOPG), whose templating properties can often play a key role in the final 2D coating.

Since many of such building blocks own well-defined semiconducting properties, the proposed research is focused on their implementation into electronic devices such as field-effect transistors (FETs). These devices are not only important for logic circuitry, but also to low-power applications such as molecular transducers and chemical sensors. Such devices are extremely sensitive to tiny changes upon the physico-chemical features of their components (e.g. source, drain, gate, and semiconducting channel).

The student will learn the basics of the whole set of surface science characterization (scanning probe microscopies, photoemission, x-ray absorption spectroscopy, electron diffraction, etc.). Furthermore, the student will be familiar with the electrical characterization of FETs along with standard electrochemical techniques for developing robust transfer processes of such semiconducting coatings.

### Publications

1. Cai J. et al. Nat. Nanotech. 2014, 9, 896-900
2. Basagni A. et al. J. Am. Chem. Soc. 2015, 137, 1802-1808
3. Sedona F. et al. Nat. Mater. 2012, 11, 970-977
4. Sedona F. et al. J. Phys. Chem C 2014, 118, 1587-1593
5. Narita A. et al. The chemical record, 2015, 295-309
6. Casalini S. et al. Org. Electron. 2013, 156-163
7. Casalini S. et al ACS Nano 2015, 9, 5051-5062

### Collaborations/Network:

Christian Durante (Dipartimento di Scienze Chimiche, Padova), Andrea Cester (Dipartimento di Ingegneria della Informazione, Padova), Paolo Samorì (Institut de Science et d'Ingénierie Supramoléculaires, Strasbourg).

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