

# Ph.D. position available in Marseille

Les Calanques, Marseille



Electron or hole transfer processes in semiconductor or insulating interfaces, which are sandwiched between metallic electrodes, are important elementary processes in **micro- and nanoelectronics**. In particular, they can be responsible for the limitation of device performance due to leakage currents that may appear along defects in the thin insulating layer - a major issue in the device industry of today. CHAMAN is a new project formed by our SPM/ALD group and the one of Dr. David Martrou at the CEMES in Toulouse (France), together with the theory group of Prof. Adam Foster at the Aalto University in Helsinki (Finland). It is supported by the French *Agence Nationale de la Recherche* (ANR). **The project's objective is** to study and understand charge transfer (CT) processes at the single-electron level between a metallic nanoparticle (NP) and a conducting support through an insulating thin film (1 to 100 nm thickness) and between two or several NPs under the influence of the insulating film. Such CT processes will be studied in dependence on the film thickness and structure (monocrystalline, polycrystalline, amorphous), and on the NP morphology (e.g., size) by **noncontact AFM** (nc-AFM) and in particular by **Kelvin probe force microscopy** (KPFM) in **ultra-high vacuum** (UHV).

**We search a 3-year Ph.D. student** who is going to help us with our work at the CINaM institut in Marseille. Alongside nc-AFM and KPFM experiments the candidate is also in charge with atomic layer deposition (ALD) sample preparation. The project foresees a collaboration with the group in Toulouse and Helsinki. The position is funded by the ANR, with a salary being comparable to standard European Ph.D. salaries. According to prior agreement, the work should start in September 2018.

**The Ph.D. student must have** an excellent knowledge of condensed matter physics and nanotechnology as well as a Master degree in either physics or a related field. Being fluent in the spoken and written **French language is absolutely mandatory**, and a basic knowledge of the English language is desired.

**We offer** an interesting work in the important field of nanosciences and surface science in conjunction with leading surface science techniques like STM, nc-AFM, KPFM and ALD. Our CINaM institute is located in a beautiful region of the Provence offering many possibilities to enjoy nature and the Mediterranean Sea. Alongside French, we speak also English and German.- Requests with information about the candidate (CV, final grades, Master thesis, publications, etc.) should be addressed to:

## Dr. Clemens Barth

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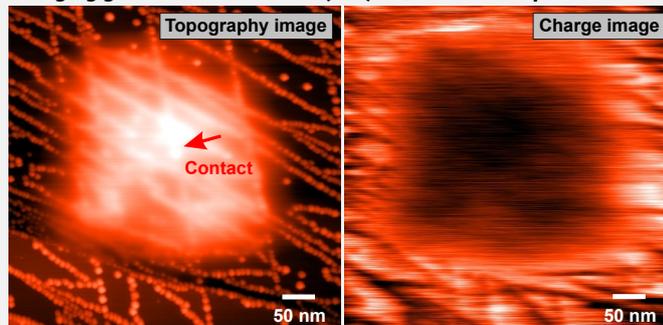
CINaM : [www.cinam.univ-mrs.fr](http://www.cinam.univ-mrs.fr)

Barth group : [clemens-barth.root-1.de](mailto:clemens-barth.root-1.de)

Martrou group : [www.cemes.fr/NC-AFM](http://www.cemes.fr/NC-AFM)

Foster group : [physics.aalto.fi/en/groups/sin/](http://physics.aalto.fi/en/groups/sin/)

Charging gold NPs on bulk NaCl(001) with the AFM tip



## Literatur for further reading

[1] C. Barth, A. S. Foster, C. R. Henry, A. L. Shluger, *Adv. Mat.***23** (2011) 477

[2] B. Hoff, C. R. Henry and C. Barth, *Nanoscale***8** (2016) 411

[3] C. Barth and C. R. Henry, *Appl. Phys. Lett.***89** (2006) 252119

[4] T. Hynninen, G. Cabailh, A. S. Foster and C. Barth, *Sci. Rep.***3** (2013) 1270