POST-doctoral position Starting date: 2018

Title: Diamond-based Electron Field Emissons Souces Trigerred by an ultrafast fiber laser
Responsible of the project: Angela Vella
Collaboration: GPM – UMR 6634 / CORIA – UMR 6614
Team: Angela Vella (GPM), Jonathan Houard (GPM), Ammar Hideur (CORIA), Thomas Godin (CORIA)

This research will be developed at the "*Groupe de Physique des Matériaux (GPM)*" in collaboration with the "*Lasers and Nonlinear Optics team*" of CORIA Laboratory at the University of Rouen Normandie, FRANCE.

Description of the project:

Activities at the GPM laboratory are centred on investigating the link between material properties and their features at the nanometer scale. One of the laboratory's teams is the "advanced instrumentation team" (ERIS) where the ultrafast laser assisted Tomographic Atom Probe was developed in the 1990s. ERIS is one of the world's leading teams in the development of laser assisted 3D atom probes, in particular concerning field evaporation processes and laser matter interaction in nanoscaled features [1-2].

The recent development of laser assisted field emitter bench opened the activity of the GPM to the ultrafast electrons photoemission domain.
The ERIS team is focusing now on the study of the electron emission from diamond nanoneedles illuminated by femtosecond laser. Currently diamond nanotips, or metallic nanotips covered by nano-diamonds, are widely studied for the static emission of electrons, due to their high emission current and greater stability, compared to tungsten tips commonly used as a cold gun in electron microscopes [3]. Despite their high performances, the emission properties of these nano-diamonds under ultrashort laser illumination remain almost unexplored. In order to better understand the mechanisms of electron emission from nano-diamond tip under ultra-short laser illumination, the post-doc will work on the optimization of a homemade ultrafast laser developed specifically for laser assisted field emission and on the caracterization of the performances of this nano-tips.
This study will be conducted using the emission and electron spectroscopy benchmark setup at GPM. This bench will be coupled with different ultrafast fiber laser sources in collaboration with the CORIA.

Qualifications and experience:

The candidate will work on the development of the ultrafast fiber laser sources, in order to couple them with the field emission bench. She/he will perform analysis on diamond nano-needles in order to have new insight on the emission properties of these samples under laser illumination.

The ideal applicant for this post-doc position should have a PhD thesis in the domain of field emission, laser matter interaction and/or ultrafast laser sources. She/he should be able to work independently and in team. His work will take place at GPM laboratory in collaboration with the "Laser and Nonlinear Optics team" of CORIA.

[1] B. Gault, F. Vurpillot, A. Vella, M. Gilbert, A. Menand, D. Blavette, and B. Deconihout, , Rev. Sci. Instrum. 77, 043705 (2006)
[2] E. Silaeva, L. Arnoldi, M.L. Karahka, B. Deconihout, A. Menand, H.J. Kreuzer, and A. Vella 'Do dielectric nanostructures turn metallic in high electric dc fields ?' Nano Letters 2014, 14 (11), pp 6066-6072
[3] Victor I. Kleshch et al., Single Crystal Diamond Needle as Point Electron Source, Scientific Reports | 6:35260 | DOI: 10.1038/srep35260.

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