Laboratoire de Photonique Quantique et Moléculaire
CentraleSupélec, ENS Cachan, CNRS
Châtenay-Malabry (near Paris), France

1-year full-time post-doctoral position vacancy

with possible renewal – Paris region, France

Localized plasmon-based ultrafast processes

CentraleSupélec, one of the French *Grandes Ecoles*,[1] hosts a research team of the *Laboratoire de Photonique Quantique et Moléculaire* (CNRS – ENS de Cachan). Its research topics cover the study and applications of the ultrafast optical and thermal properties of plasmonic nanoparticles.

Background, Context

Thanks to the localized plasmon resonance phenomenon in metal nanoparticles (NPs), one can efficiently and very quickly inject energy in the latter by ultrashort light irradiation. From the series of the subsequent exchange and relaxation mechanisms : (1) the local optical properties are modified in a fast transient way;[2] by coupling plasmonic modes and photonic modes in microcavities, one may then conceive optically controlled photonic functions.[3,4] (2) A strong electromagnetic near-field enhancement is induced; this can generate cascade processes in the host medium.[5] (3) Irradiated plasmonic nanoparticles act as nanoscale heat sources due to nonradiative losses;[6] this converting process can be employed for realizing chemical or biological functions.
One can then envisage materials or devices whose functionality is only activated and controlled by light.

Research topics of the lab

As the different mechanisms involved in these process exhibit a specific dynamics, time-resolved spectroscopy appears to be a relevant analysis tool. Our team has developed an experimental setup allowing the broadband spectroscopic measurement of the ultrafast optical response dynamics of materials. This will soon be included in a specific microscopy system.
Our ongoing topics focus on biomedical applications (pulsed photo-induced intracellular gene delivery, cell adhesion and destruction, hypoxic photodynamic therapy,…), ultrafast photonic modulation of near-field energy transfer, development of time-resolved spectroscopy in a microfluidic environment.

Job description

The research assistant will work together with the other team members (1 professor, 1 assistant professor, 1 research engineer, PhD and master) and the partners from other laboratories. She/he will propose, develop and carry out optics experiments and models devoted on one of the team topics. Take-home salary is about 2000 euros a month, including public health insurance and half of public transportation fees.

Position application

The applicant is specialized in nano-optics, preferably being experienced in time-resolved ultrafast laser experiments. A good knowledge of localized plasmons in metal nanoparticles will be appreciated.
The position is available right now. Please apply by sending detailed CV and recommendation letter by e-mail only, to B. Palpant, professor at CentraleSupélec: bruno.palpant@centralesupelec.fr.
The final choice among applicants will be made by late summer 2015.

[1] http://www.ecp.fr/lang/en/homepage
[2] X. Wang, Y. Guillet, P. R. Selvakannan, H. Remita and B. Palpant, *J. Phys. Chem. C.* **119** (13), 7416-7427 (2015).
[3] X. Wang and B. Palpant, *Plasmonics* **8**, 1647 (2013).
[4] X. Wang, R. Moreira, J. Gonzalez and B. Palpant, *Nano Letters* **15**, 2633–2639 (2015).
[5] T. Labouret, J.-F. Audibert, R. Pansu and B. Palpant, *Small* (2015).
[6] B. Palpant, in "Gold nanoparticles for physics, biology and chemistry", ed. C. Louis and O. Pluchery, (Imperial College Press, 2012).