ParisTech

Chimie Paris ParisTech | PSL

RESEARCH TOPIC FOR THE PARISTECH/CSC PHD PROGRAM

Field: Chemistry, Physical Chemistry and Chemical Engineering

Subfield:

Title: Design of new electrode materials based on nanoparticles for electrochemical nanosensing applications with environmental interest.

ParisTech School: Chimie ParisTech | PSL
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(Lab/Advisor website): https://www.ircp.cnrs.fr/

Short description of possible research topics for a PhD: In the field of material science, one of the main question is, does it make sense to define desired properties first and then design the material with the architecture that match these properties. The actual research topic of our group is within this concern, and it consist of new material design developments that emerge new properties and functions. Actually, one of the main research topics we are developing is dealing with the enhancement of detection limit and selectivity of sensing, based on nanostructure through a new design of metallic nanoparticles modified electrode. Our design strategies combine nanomaterials and different deposition methods to prepare desired material structure of required properties.
Over the years, our group has acquired expertise in nanoparticle synthesis, surface modification and deposition of thin film based on nanoparticles. Our goal in this PhD proposal is to develop hierarchical electrode material based on metallic nanoparticles. We expect that our results could be helpful in understanding the electrochemical properties of hierarchical electrode and may have potential applications in sensing. Additional, the performance of prepared electrode will be optimized.

Required background of the student: Electrochemistry, ideally with some knowledge of surface modification and/or nanomaterial synthesis.

A list of 5 (max.) representative publications of the group: (Related to the research topic)

1. A. Taleb, X. Yanpeng, P. Dubot, J. Electroanal. Chem. 693 (2013) 60.
2. A. Taleb**,** X. Yanpeng, P. Dubot, Applied surface science, 420 (2017) 110-117.
3. Sana Falah, Xue Yanpeng, Abdelhafed Taleb, Mohamed Beji, Electrochemica Acta, 292(1) (2018) 594-601.
4. Z. Ait-Touchente, S. Falah, E. Scavetta, M. M. Chehimi, R. Touzani, D. Tonelli, A. Taleb, Molecules 25 (2020) 3903.