

## Novel Strategies to Metal Oxide Hybrid Nanostructures

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The current trend in various energy applications, ranging from batteries to electrolyzers, lays in the control of physicochemical and morphological properties of materials and their interfaces. Just to give some peculiar examples, due to their insulating nature (e.g. LiFePO<sub>4</sub>) or their dramatic volume changes (e.g. Si) many materials have been disregarded for decades in battery applications. Nowadays, through nanostructuring and surface coating, LiFePO<sub>4</sub> and Si have become among the most promising materials for the next generation batteries that might power our cars. Nanostructuring gave also a new hope to technologies that were discarded such as Li-Air and Li-S. During this seminar, recent strategies for metal oxide synthesis and nanostructuring targeting energy and environmental applications will be discussed. Especially, we will focus on one-pot strategies for the fabrication of hybrid materials by non-hydrolytic sol-gel chemistry[1,2] and the synthesis of heterostructured nanocrystals by galvanic replacement reaction.[3]

We will see that nowadays colloidal chemistry allows a control in terms of composition, crystalline structure, morphology and nanostructuring that would have been unimaginable just 10 years ago.

### References:

[1] *Room Temperature Hydrogen Sensing with Hetero-nanostructures Based on Reduced Graphene Oxide and Tin oxide*

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[2] *Efficient and tuneable photoluminescent boehmite hybrid nanoplates lacking metal activator centres for single-phase white-LEDs*

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[3] *Galvanic Replacement Reactions in Metal Oxide Nanocrystals*

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