

Séminaire SOLEIL

NanoLego : Directing Nanomaterial Architecture @ sub 10nm Scale

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Invité par Alina VLAD

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Séminaires

Nanoparticles (NPs) are ideal multifunctional features. Arrays thereof provide an enticing regime wherein the individual and collective properties of the NPs can be exploited simultaneously. The crucial factor in their synthesis lies in the precise control of their architecture i.e., size, composition, and pattern formation. The synthesis of mono-disperse core-shell (CS) NPs is challenging, typically involving multiple steps (e.g. reduction, purification and NP stabilization with ligands).

This presentation reveals a novel, simple and scalable method to achieve multi-component CS NPs with elegantly controlled architecture in a single reduction step. Rather than adopting the classical route of sequentially reducing metal salts to form core and shell NP constituents, this work enhances the concept of diblock copolymer micelles as nanoreactors to synthesize ordered arrays of ligand-free CS NPs.¹

A preliminary example of synthesis-determined optical and catalytic response of NPs prepared via micelle nanolithography will be illustrated with a core focus on its impact in silicon nanotube synthesis. The synthesis of SiNTs is challenging but yet enticing because unlike strong π bonds in sp^2 hybridized carbon, the stable sp^3 bonds in Si tends to yields fourfold coordination with four equivalent directions of growth. This coordination fundamentally favors a bulk-like core (nanowire) rather than hollow structures (nanotube). This presentation will elucidate the NP-assisted procedure adopted to achieve SiNTs with features mimicking those of carbon nanotubes.²

The nanomaterials shown in this presentation and the platforms on which they are developed are expected to have conducive impact in catalytic, plasmonic, biomedical as well as renewable energy systems, just to name a few.

Acknowledgements

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References

[1] B.N. Mbenkum, A. Diaz-Ortiz, L. Gu et al., *J. Am. Chem. Soc.* 2010, 132 (31), 10671-10673.

[2] B.N. Mbenkum, A.S. Schneider, G. Schuetz et al., *ACS Nano*. 2010, 4(4), 1805-12.



Ce séminaire sera suivi d'une pause-café



Formalités d'entrée : accès libre dans l'amphi du Pavillon d'Accueil. Si la manifestation a lieu dans le Grand Amphi SOLEIL du Bâtiment Central, merci de vous munir d'une pièce d'identité (à échanger à l'accueil contre un badge d'accès).

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