Seminars at the Melbourne Centre for Nanofabrication

Soft Plasmene Nanosheets: From Design to Applications

Prof. Wenlong Cheng (ANFF-VIC Tech Ambassador & Department of Chemical Engineering, Monash University)

10/08/2018 2-3pm







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Abstract:

My nanobionics research lab concentrate on the design of soft/hard nanohybrids based on metallic nanoparticles capped by soft ligands including DNA, polymer and alkyl molecules.

We have successfully applied such soft particles to four major directions:

- (1) assembling soft plasmonic nanoparticle superlattice sheets (soft plasmene sheets);
- (2) fabricating electronic skins (e-skins) for wearable sensors
- (3) fabricating soft energy devices;
- (4) DNA aptamer-targeted and light-controlled drug delivery.

In this talk, I will focus on the discussion of the first project for producing soft, elastic, two-dimensional plasmonic nanoparticle superlattice sheets (soft plasmene sheets) by self-assembly of polystyrene-capped metal nanoparticles. The soft nanosheets could be folded into 1D nanoribbons and 3D origami, and they can serve as a new-class SERS substrate which is soft, elastic and surface-attachable. This enabled the direct chemical identification on topologically complex surfaces such as banknotes and coins, and application as new-generation of anti-counterfeit security labels and as ultrathin lens.

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