

Building Soft Plasmonics with Monodispersed Nanocrystals

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ABSTRACT

Artificial optoelectronic devices are often rigid and planar, incompatible with biological systems which are typically soft and elastic. Recently, there have been an increasing interest in the fabrication of plasmonic nanostructures on elastomeric substrates and exploring the impact of mechanical deformation including bending, torsion, and stretching on the collective plasmonic resonance properties. This burgeoning field may be defined as soft plasmonics (or soft mechanoplasmonics), analogous to soft electronics.

In this talk, I will briefly discuss our recent success in producing soft, elastic, two-dimensional plasmonic nanoparticle superlattice sheets (soft plasmene sheets) by self-assembly of organically-capped metal nanocrystals. These soft plasmonic nanosheets are free-standing and could be folded into 1D nanoribbons and 3D origami. The soft plasmonic nanosheets can also be transferred onto various elastomeric substrates for various sensing applications. In particular, the nanosheets can also serve as a new-class SERS substrate which is soft, elastic and surface-attachable. The can also be used for detecting tensile strains and fabricating soft photocatalytic “leafs” for omnidirectional solar to chemical conversion.

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Short BIOGRAPHY

Wenlong Cheng is a professor and director of research in the Department of Chemical&Biological Engineering at Monash University, Australia. He is currently a fellow of Royal Society of Chemistry and was also an Ambassador Tech Fellow in Melbourne Centre for Nanofabrication. He earned his PhD from Chinese Academy of Sciences in 2005 and his BS from Jilin University, China in 1999. He was Alexander von Humboldt fellow in the Max Planck Institute of Microstructure Physics and a research associate in the Department of Biological and Environmental Engineering of Cornell University. He founded Monash NanoBionics lab at the Monash University in 2010. His research interest lies at the Nano-Bio Interface, particularly self-assembly of 2D plasmonic nanomaterials, DNA nanotechnology, electronic skins and stretchable energy devices. He has published >180 papers. He is currently the scientific editor for *Nanoscale Horizon* (Royal Society of Chemistry) and the editorial board members for a few journals including *iScience*, *Chemosensors*, and *Austin Journal of Biomedical Engineering*.