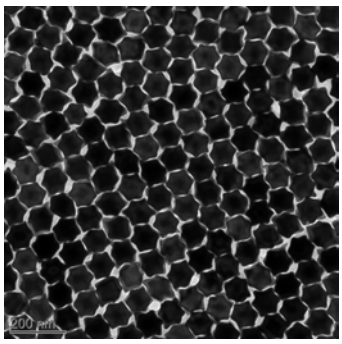
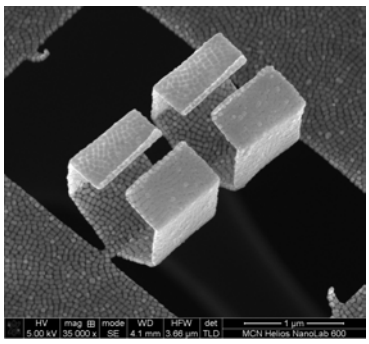
Ultrathin Two-Dimensional Plasmene Nanosheets

A novel class of 2D materials, termed "Plasmene" have been developed in Monash NanoBionics Lab. Plasmene is free-standing in nature with ultimate single-particle thickness limit while exhibiting superior mechanical robustness. The unique optical properties and self-folding capability of plasmene makes it a unique material base for development of ultrathin metamaterias and sensing devices.

2D Nanosheet



3D Plasmonic Origami



Lead Scientist

Prof. Wenlong Cheng

Research Expertise

Prof. Wenlong Cheng's Nanobionics research group has expertise in design organically-capped metal nanoparticles (soft nanometals) for applications in soft plasmonics, soft electronics and biology. As for soft plasmonics as shown in this presentation, the main goals are to develop approaches to fabricate 2D plasmonic nanosheets, investigate the fundamental structure-function relationships and exploit the new collective coupling phenomena for design of novel optical devices and sensors.

Key Contact

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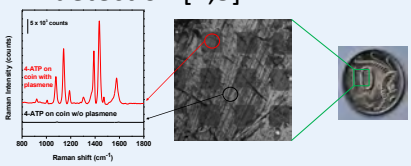
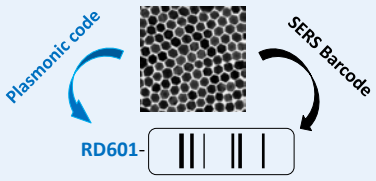
Applications

- Hybrid fiber-plasmene waveguide coupler [1]
- Soft surface-enhanced Raman scattering (SERS) substrates for chemical detection [2,3]



- Dual plasmonic and SERS coded anti-counterfeit label [4]



Key Publications

[1] *ACS Nano* **8**, 11086-11093 (2014)
[2] *Adv. Opt. Mater*. **3**, 919-924 (2015)
[3] *Anal. Chem*. **87**, 5263-5269 (2015)
[4] *Adv. Opt. Mater.* DOI:10.1002/adom.201500335 (2015)
[5] *Nature Materials*, **8**, 519-525 (2009)

Research Facilities

- Chemical lab for nanoparticle synthesis

- UV-vis spectrophometer for solid and liquid samples

- Electron microscopy imaging, advanced lithography equipment

MCN Melbourne Centre for Nanofabrication

- Raman spectroscopy instruments