

Photonic Subwavelength Structures and Applications

Applications

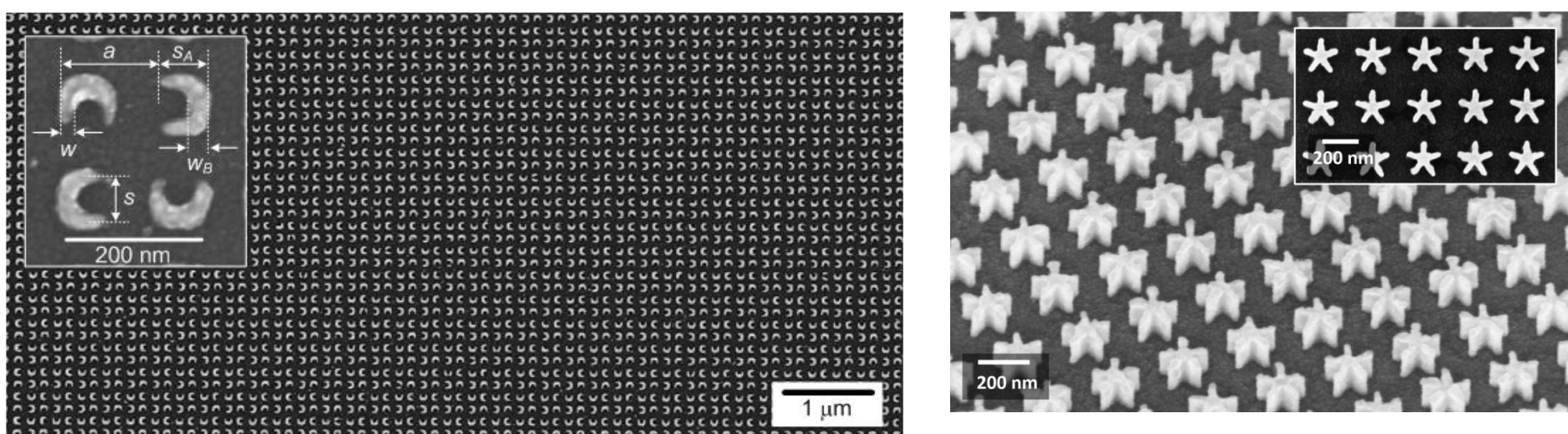
- Ultrasensitive sensing
- Raman enhancement
- Surface plasmon enhanced photodetection
- Optical nanoantenna for nanoscale light emitter
- Photonic interconnect
- SPP modulation
- Superresolution imaging

Methodologies

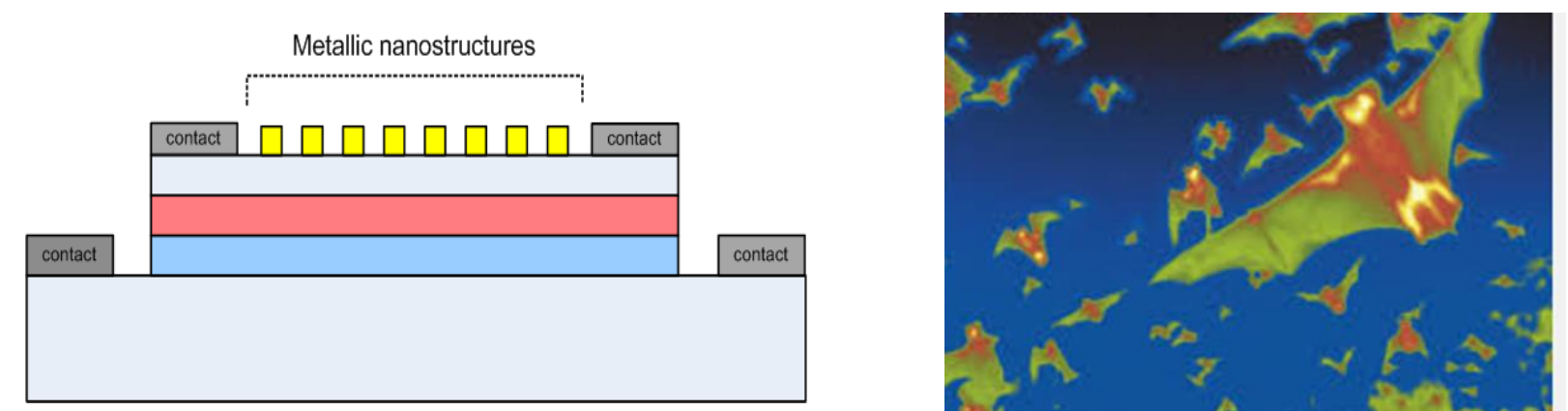
Deep subwavelength photonic structure is an essential component for making metasurfaces/metamaterials with novel emerging optical properties, which proved to be useful for various applications including ultrasensitive sensing, molecular fingerprinting, Raman spectroscopy, optical nanoantenna, and surface plasmon mid-infrared photodetector. However, due to deep subwavelength nature in their dimensions, the fabrication of these metasurface remains challenging. This has become particularly challenging for visible spectrum.

Some Results

Large scale isotropic split ring resonator array

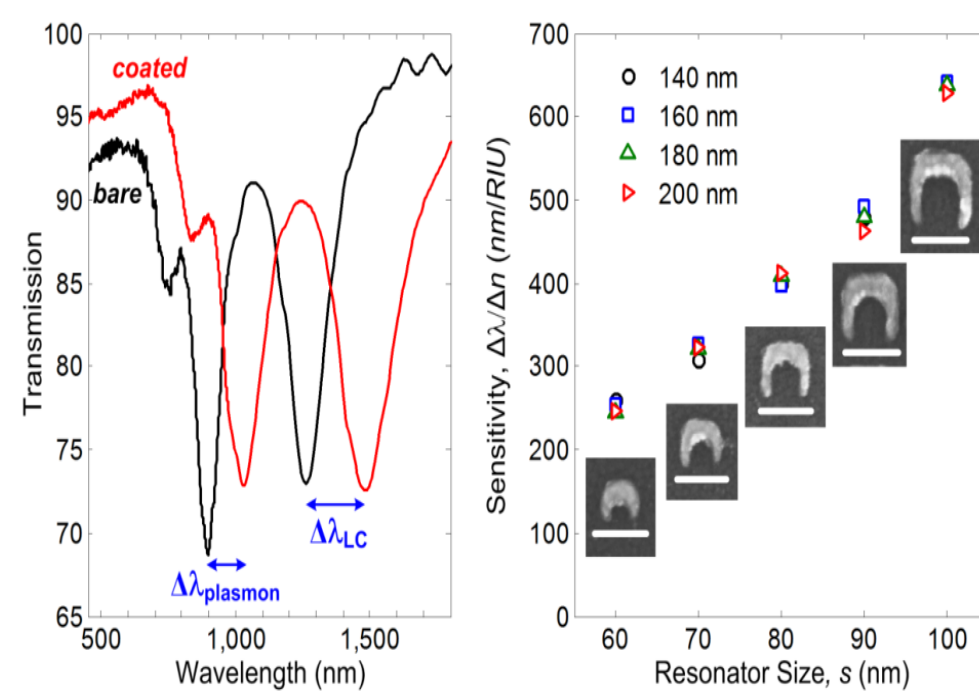
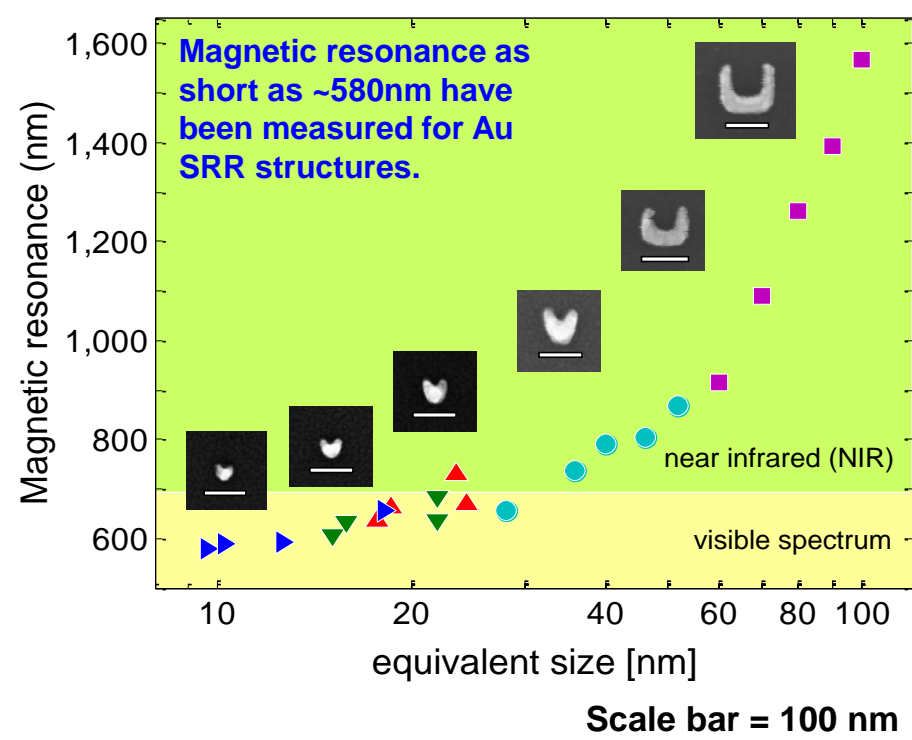


Surface Plasmon Enhanced Mid-IR Photodetector

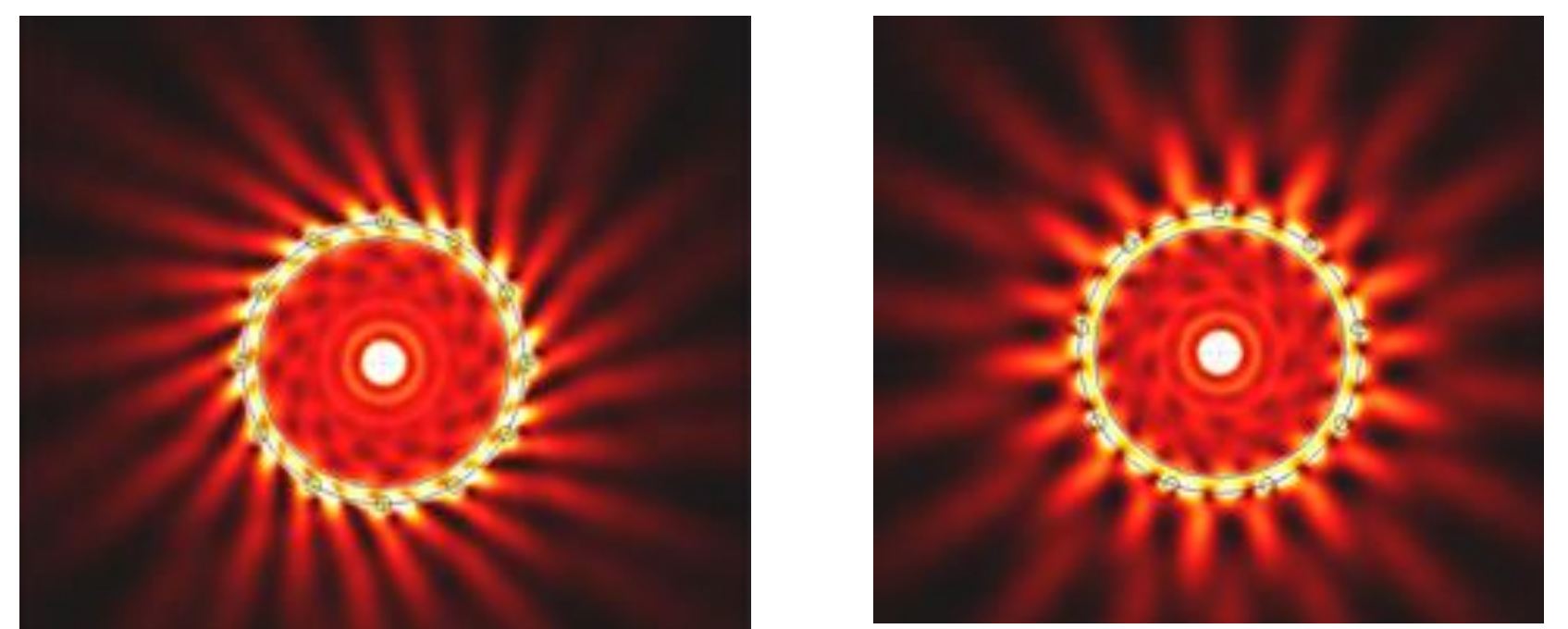


Au, Ag and Al SRRs from IR to VIS

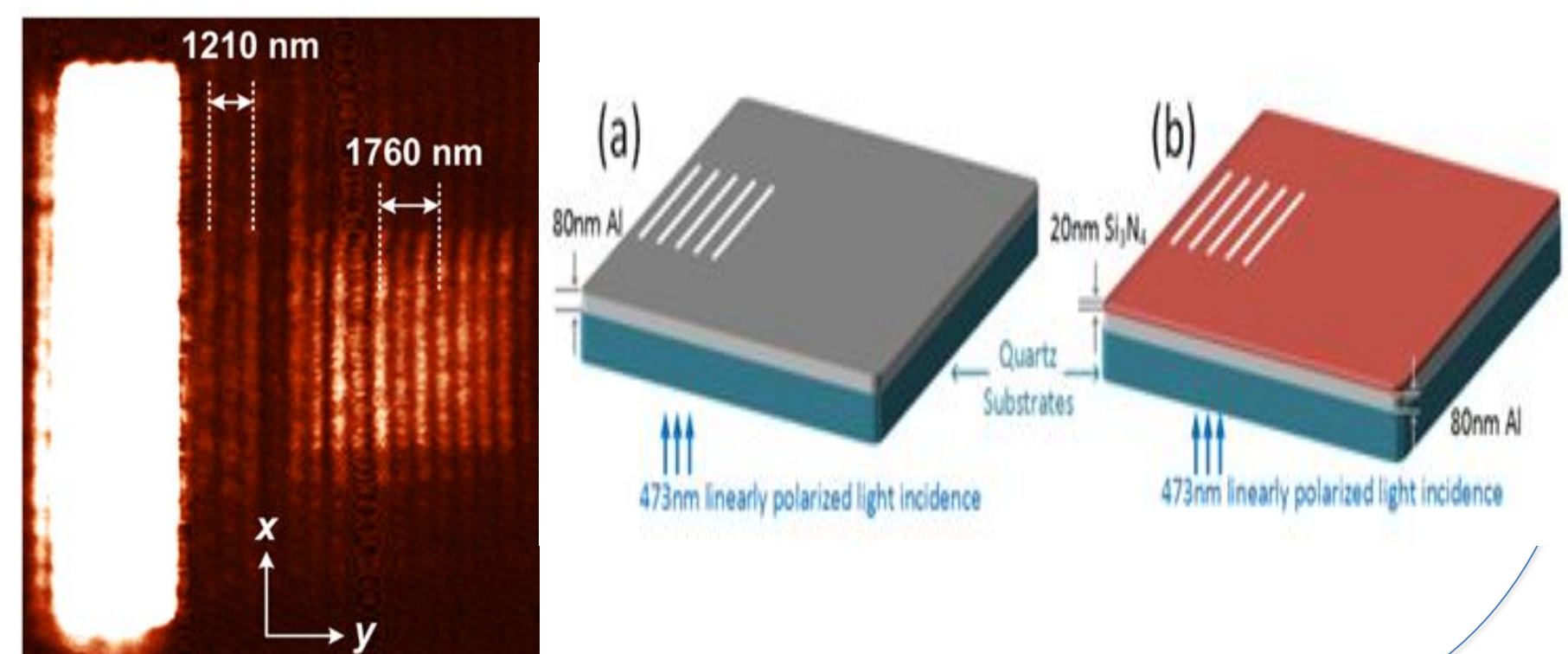
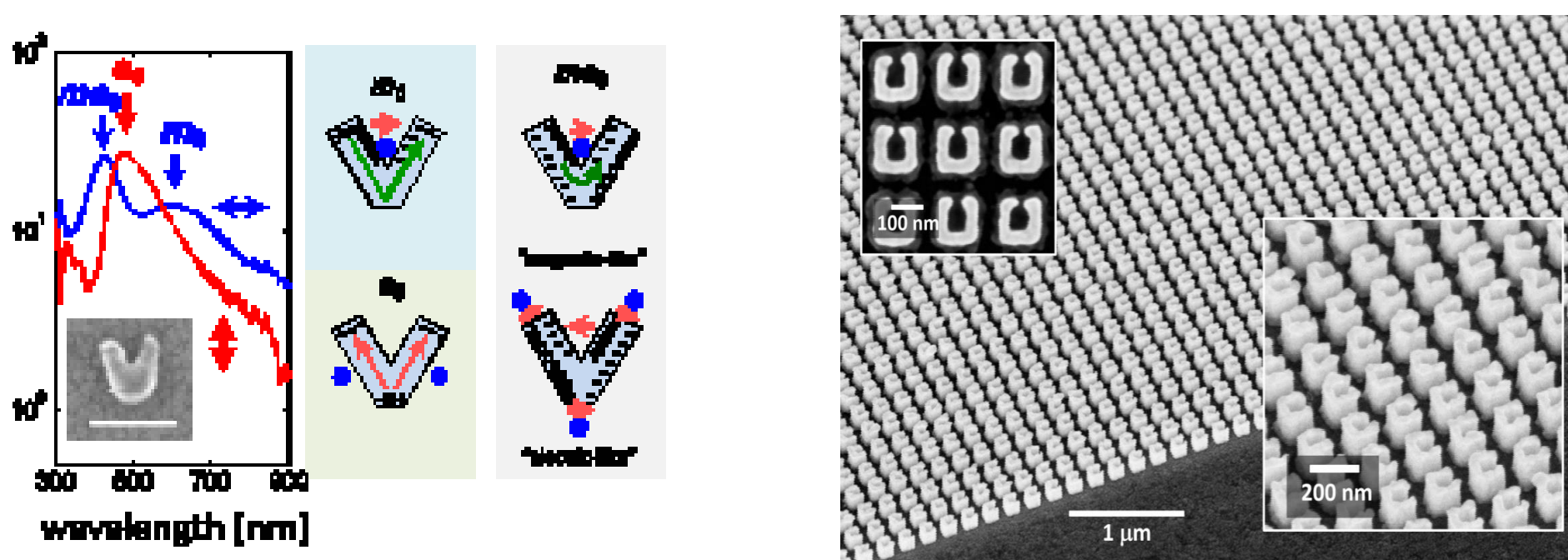
Metamaterial-based sensor



Cogwheels for SPP vortex



Metasurfaces for SPP manipulation



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Related Publications

- L. Y. M. Tobing, et al., *Advanced Materials*, DOI: 10.1002/adma.201504061
- S. Kou et al, *Light: Science & Applications* (2016) **5**, e16034;
- L. Y. M. Tobing, et al., *Sci. Rep.* **3**, 2437 (2013)
- L. Y. M. Tobing, et al., *Adv. Opt. Mater.* **3**, 280 (2014)
- Xu et al, *Optics Express*, **23**(17), 22883-22889 (2015)
- Tong et al, to be published.