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춘계학술대회

Fabrication of plasmonic arrays of nanodisks and nanotriangles by nanotip indentaion lithography and their optical properties

김현우(KRICT), 김태완(전북대), 이남석(NINT), 신채호(KRISS)

발표자 : 김현우

한국현미경학회

hwkim@krict.re.kr

한국현미경학회
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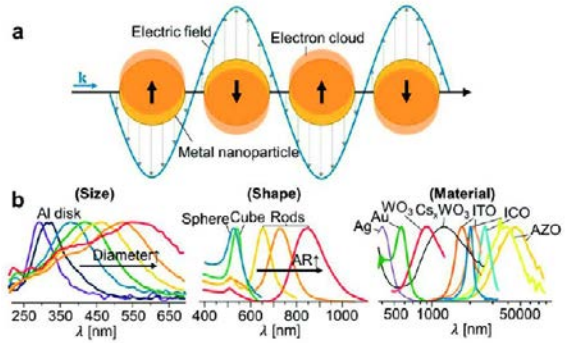
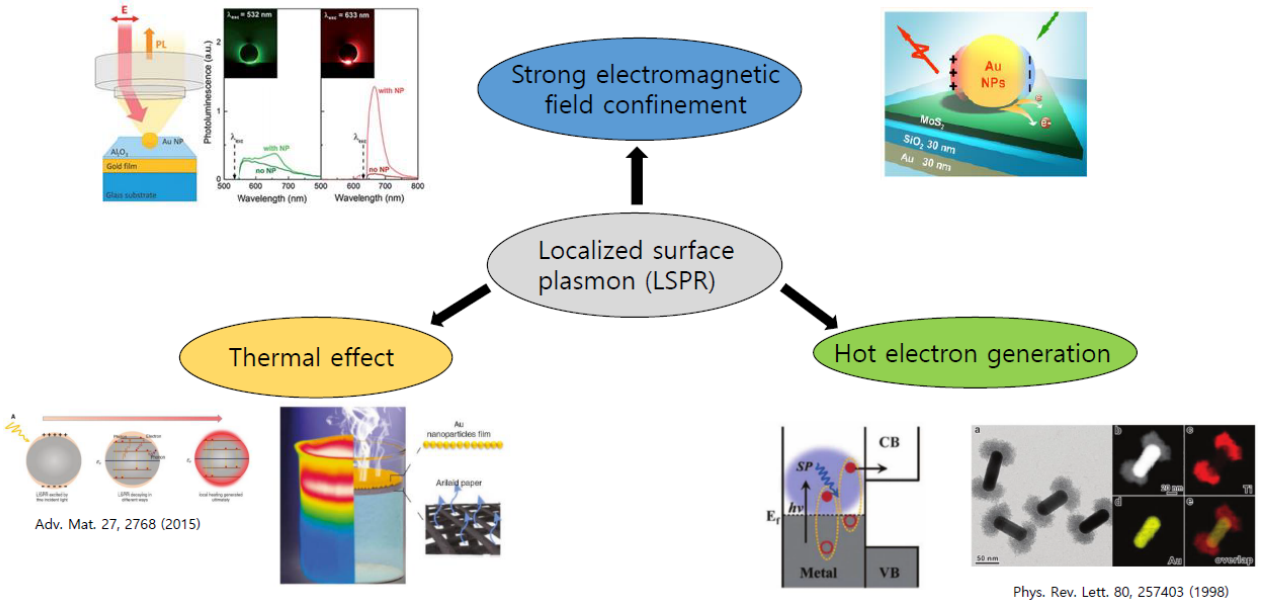
Localized surface plasmon (LSPR)



- Collective oscillation mode of electrons localized in the surface of metallic nanostructures.
- LSPR modes are tunable via control of size, shape, and composite materials of the nanostructures.

Plasmonic effects induced by localized surface plasmon (LSPR)

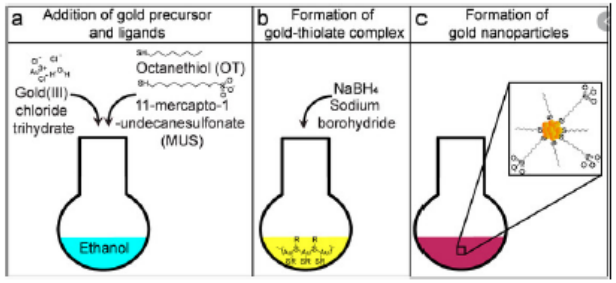


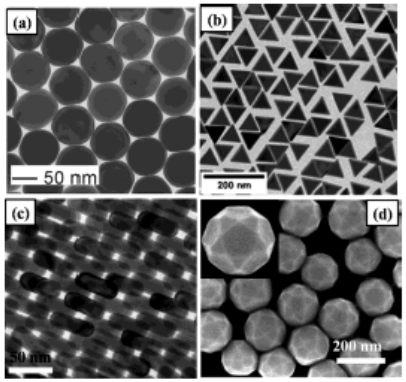
Adv. Mat. 27, 2768 (2015)

Phys. Rev. Lett. 80, 257403 (1998)

Metallic nanostructure patterning for plasmonic enhancement

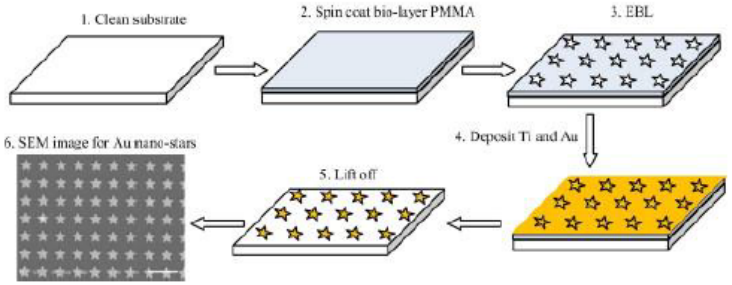
• Chemical synthesis

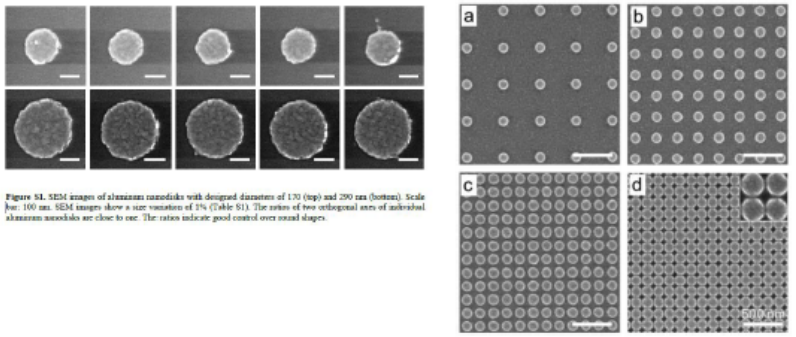




- Pros: high uniformity, low cost, mass production
- Cons: randomness in position and orientation

• eBeam Lithography





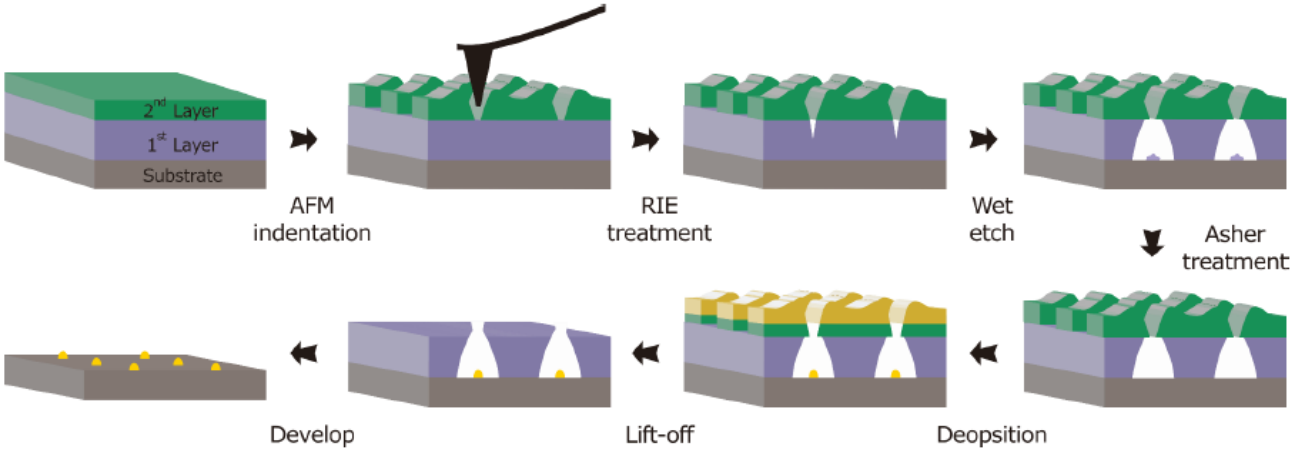
Shuhua Wei et al. (2016)

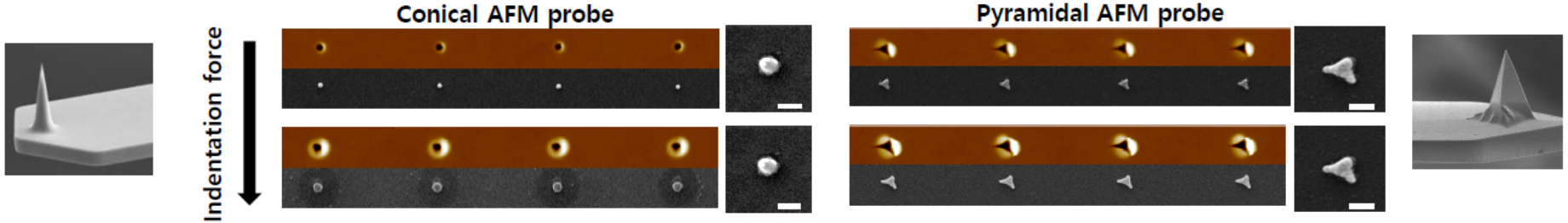
- Pros: high uniformity, precise control in position and orientation
- Cons: **high cost in process and instrument**

Phys. Rev. Lett. 80, 257403 (1998)

Plasmonic nanostructure preparation: Nanotip Indentation Lithography (NTIL)

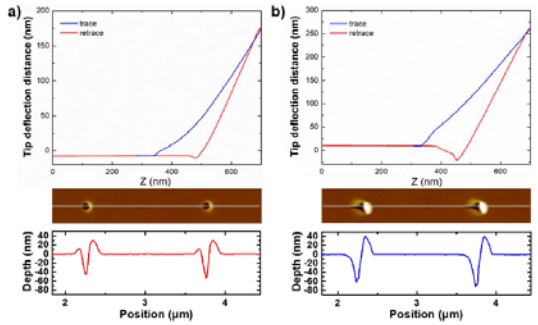
- AFM probe indentation for mask patterning





Nanotip Indentation Lithography (NTIL)

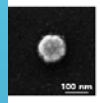
- AFM probe indentation force control

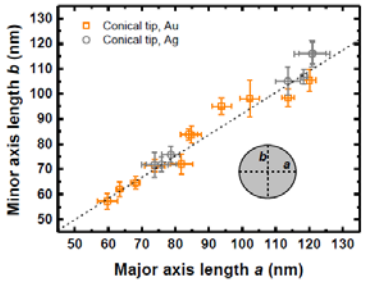


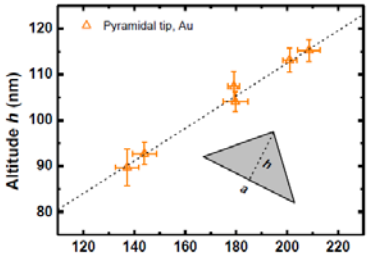
- Nanotip indentation force (~nN) is monitored via tip deflection distance (x). (F ~= k * x)

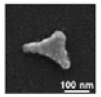
Plasmonic nanostructure morphology

- Size invariance in aspect ratio of NTIL fabricated Au nanodisk and triangle





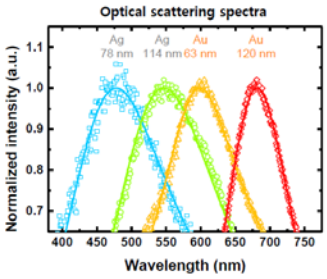


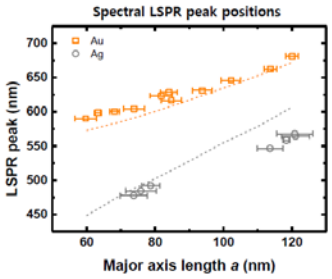


- Lengths along major and minor axis show linear trends with size invariances.

Optical properties of plasmonic nanostructures

- LSPR peak positions of Au nanodisk

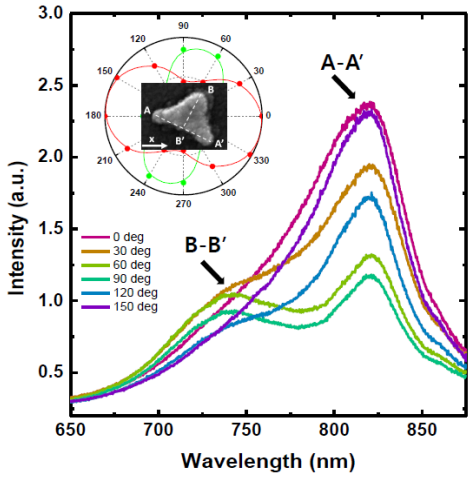


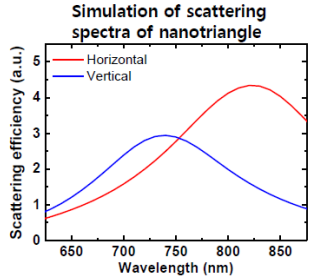


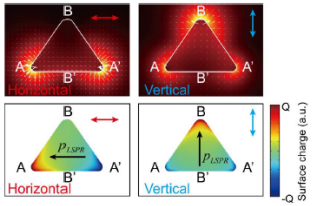
- Tunning range of Au nanodisk LSPR covers bandgap energy of MoS_2. (~670 nm)

Polarization selective LSPR modes of plasmonic nanostructures

- Incident polarization dependent scattering spectra of nanotriangle







"Purcell enhanced photoluminescence of few-layer MoS2 transferred on gold nanostructure array with plasmonic resonance at conduction band edge". Nanoscale (IF : 6.895) (2021년 published)

"Fabrication of Plasmonic Arrays of Nanodisks and Nanotriangles by Nanotip Indentation Lithography and their Optical Properties". Nanoscale (IF : 6.895). Back cover posted (2021년 published)

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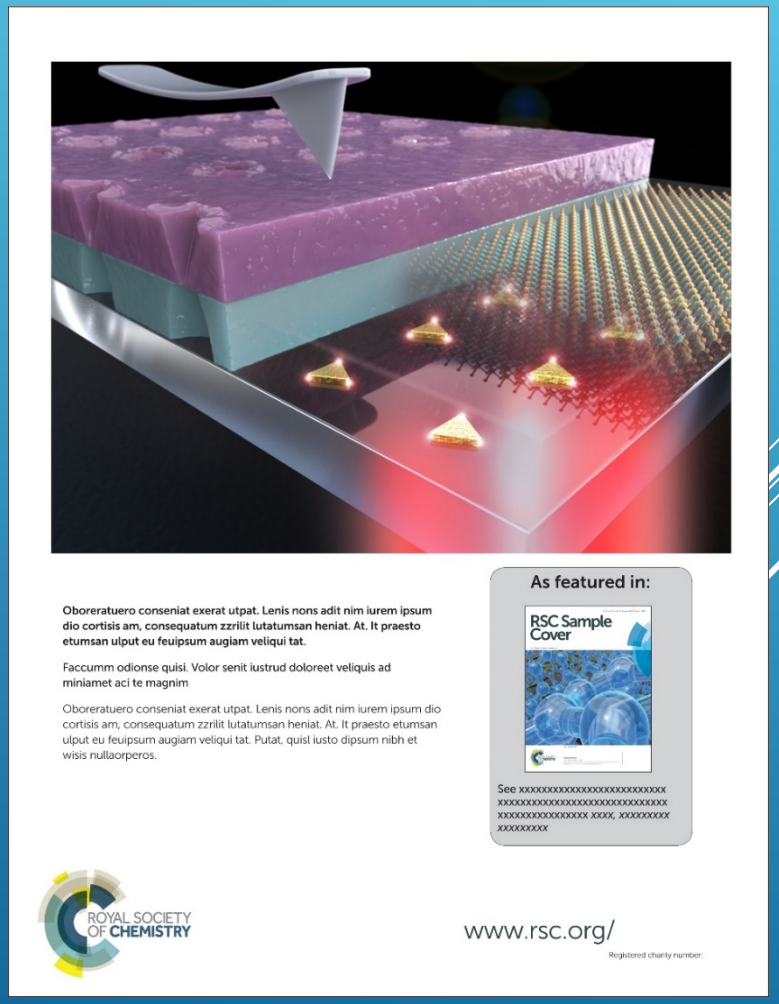

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