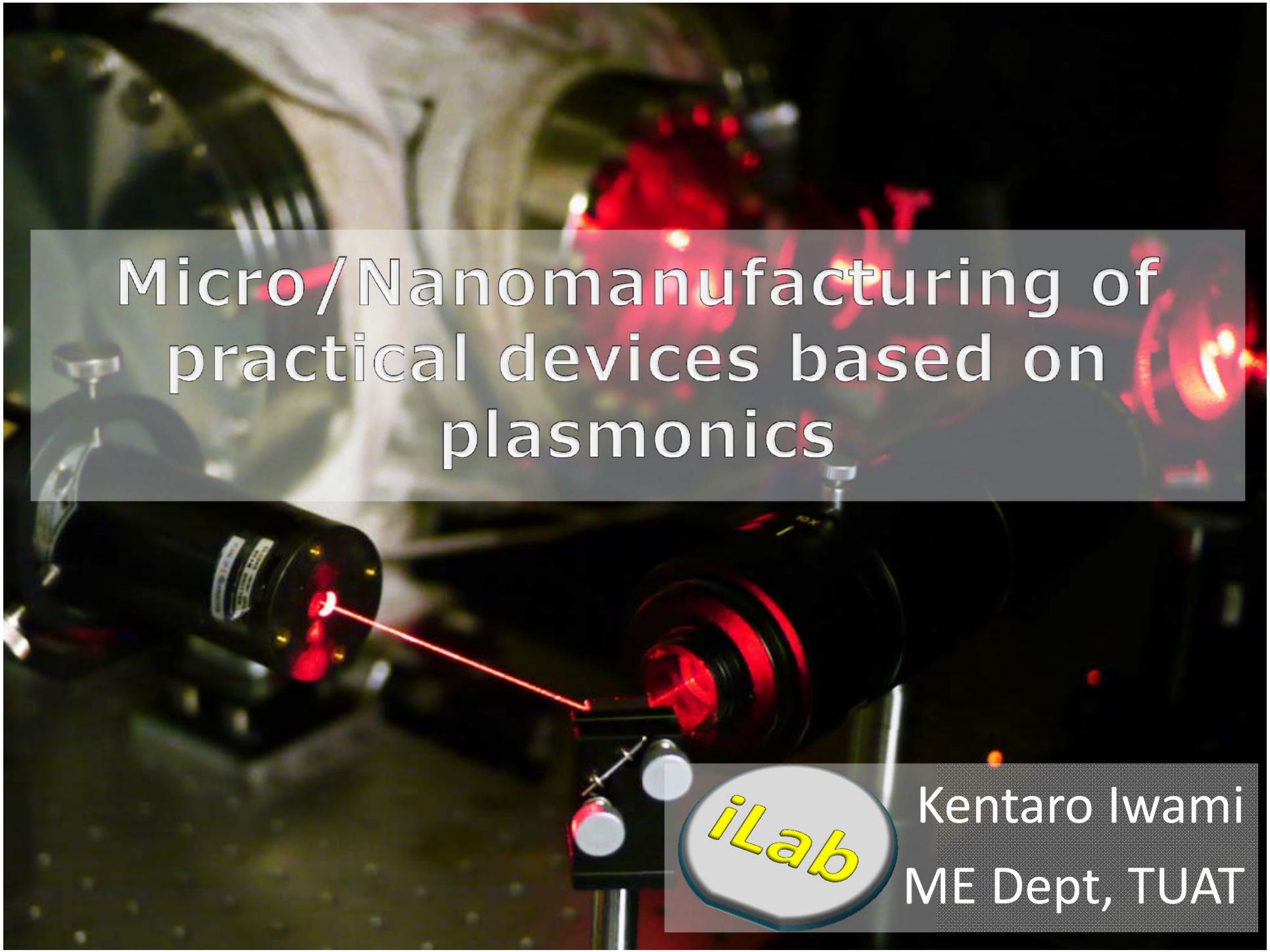
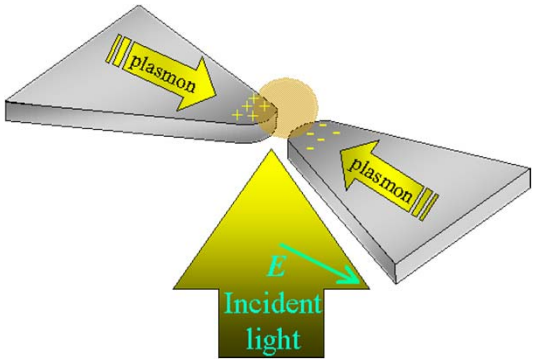

Micro/Nanomanufacturing of practical devices based on plasmonics
iLab
Kentaro Iwami
ME Dept, TUAT

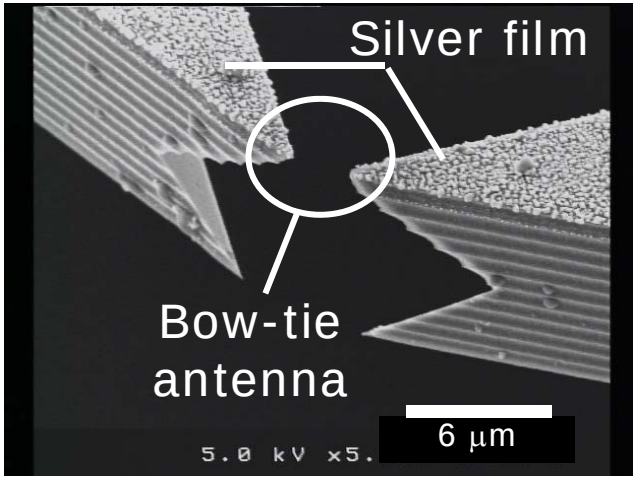
Plasmonics

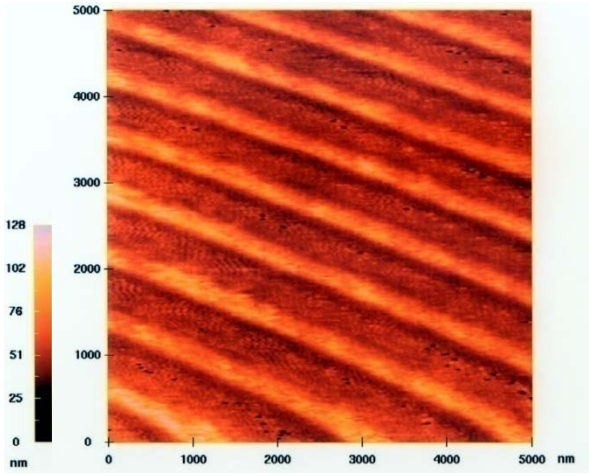
- Plasmon: A collective oscillation of free electron
  - ✓Strong resonant mode
  - ✓Involves electric field enhancement and/or

Applied to microscopy, spectroscopy and so on
Much functionality can be emerged based on various materials/structures



Bow-tie antenna
(Field enhancement by gap-coupled plasmon mode)





Fabricated bow-tie antenna probe and SNOM image obtained by this probe

Plasmon Stimulated Field Emission

Needs for optically-stimulated/triggerd field emission

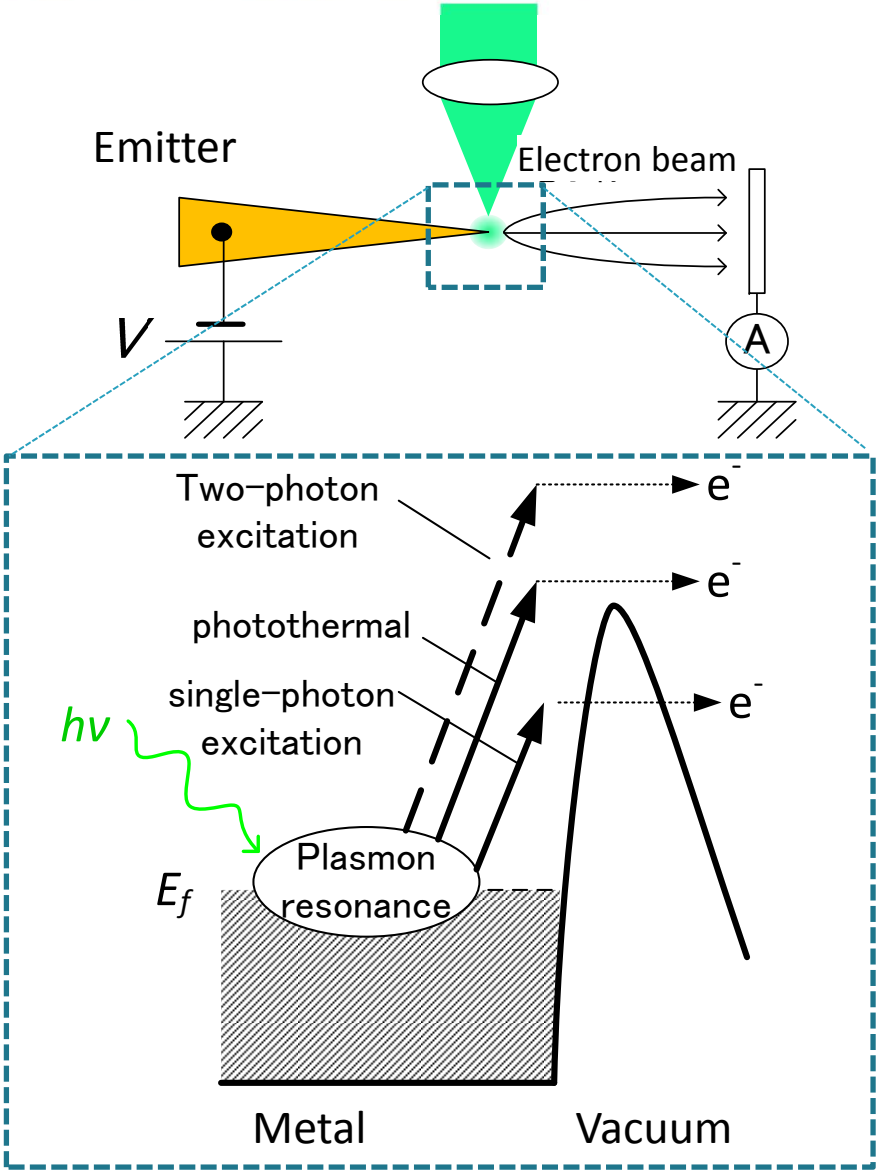
⇒We proposed plasmon-stimulated field emission

Principle

・Laser irradiation to the emiter tip with a plasmon-resonant wavelength

・Strong phototthermal electron excitation due to plasmon resonance

→ Decrease of Vext
Ion/Ioff > 100



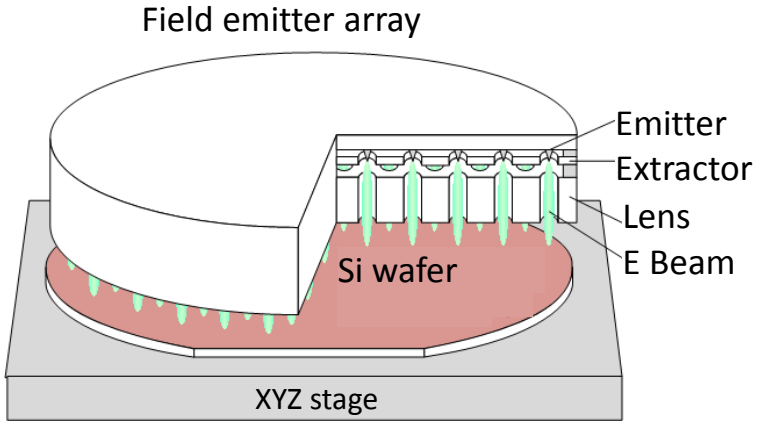
Application and perspeftive for PSFE

Market requirement

Large enhancement factors, optical emission triggering

→Study for PSFE fundermentals

→Application for MEMS produntion



Study about PSFE from scientific side

Electron spectroscopy
Simulation

Development of PSFE-based field emitter array

Parallel lithography and/or SEM using optically-triggered FEAs