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Spectroscopic Nanoimaging on Nanomaterials

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*Online: Please click [HERE](#).

In this talk, I outline my research in KRICT and SKKU that involves research on spectroscopic nanoimaging on nanomaterials. To best probe basic science related to nanomaterials, we invent advanced spectroscopic nanoimaging instruments and apply them to nanomaterials. For example: Nanogap-enhanced Raman Scattering probes (NERS probes) [1-2], hybrid UpConverting Nano Particles (UCNPs) [3], and recently discovered photon Avalanching Nano Particles (ANPs). These methods provide us with access to physiochemical behavior at small (and critical) length and time scales. For example, NERS probes exhibit greater than 10^9 amplification of Raman scattered photons at the external plasmonic nanogap junction between two plasmonic nanoparticles [1] and 3-dimensional internal plasmonic nanogap junction between plasmonic core nanoparticles and shell nanoparticles [2]. Most recently, we have discovered drastically amplifying upconverting nanoparticle(UCNPs), revealing "tsunami-like" photon avalanching phenomena, that we have named as Avalanching NanoParticles (ANPs) [4].

I suggest this general approach of spectroscopic nanoimaging on nanomaterials will continuously yield further achievements in basic science as well as application areas, such as spectroscopic nanobio imaging, light energy harvesting in NIR range, and highly sensitive broad band photonic sensors.

References

- [1] YDS*, J-M Nam*, "Nanogap-engineerable Raman-active nanodumbbells for single-molecule detection", *Nature Materials*, 9, 60 (2010), *cited >1,070 times*.
- [2] YDS*, J-M Nam*, "Highly uniform and reproducible surface-enhanced Raman scattering from DNA-tailorable nanoparticles with 1-nm interior gap", *Nature Nanotechnology*, 6, 452 (2011), *cited >950 times*.
- [3] YDS*, P.J. Schuck*, T.W. Schmidt*, D. Jin*, "Future and challenges for hybrid upconversion nanosystems", *Nature Photonics* 13, 828 (2019)
- [4] YDS*, A. Bednarkiewicz*, B.E. Cohen*, E.M. Chan*, P.J. Schuck*, "Giant nonlinear optical responses from photon-avalanching nanoparticles" *Cover, Nature* 589, 230 (2021); *News & View, Nature* 589, 204 (2021).

You are cordially invited to attend!

Special Seminar