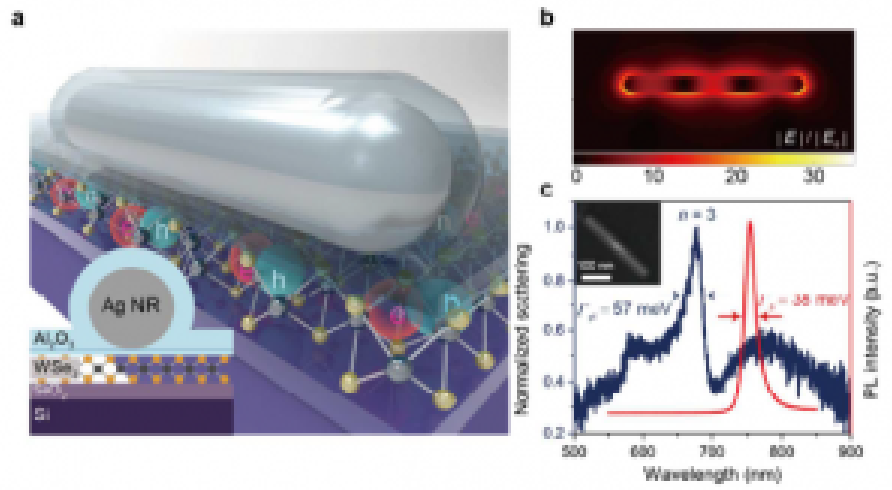
Manipulating coherent plasmon-exciton interaction in single silver nanorod on monolayer WSe2



Strong coupling between plasmons and excitons in nanocavities can result in the
formation of hybrid plexcitonic states. Understanding the dispersion relation of plexcitons is important both for fundamental quantum science and for applications including optoelectronics and nonlinear optics devices. The conventional approach, based on statistics over different nanocavities suffers from large inhomogeneities from the samples, owing to the non-uniformity of nanocavities and the lack of control over the locations and orientations of the excitons. Here they report the first measurement of the dispersion relationship of plexcitons in an individual nanocavity. Using a single silver nanorod as a Fabry-Pérot nanocavity, they realize strong coupling of plasmon in single nanocavity with excitons in a single atomic layer of tungsten diselenide. The plexciton dispersion is measured by in-situ redshifting the plasmon energy via successive deposition of a dielectric

layer. Room temperature formation of plexcitons with Rabi splittings as large as 49.5 meV is observed. Realization of strong plasmon-exciton coupling by in-situ tuning of the plasmon provides a novel route for manipulation of excitons in semiconductors.

Source:http://pubs.acs.org/doi/abs/10.1021/acs.nanolett.7b01176

Related paper: Di Zheng et al.,Manipulating coherent plasmon-exciton interaction in single silver nanorod on monolayer WSe2,*Nano Lett.*, 17 (6), pp 3809−3814,(2017).