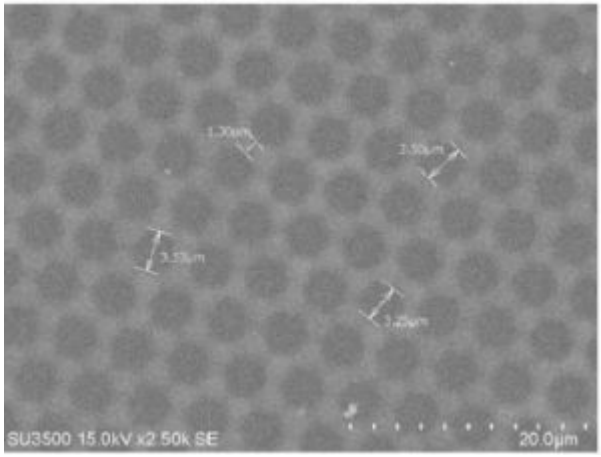
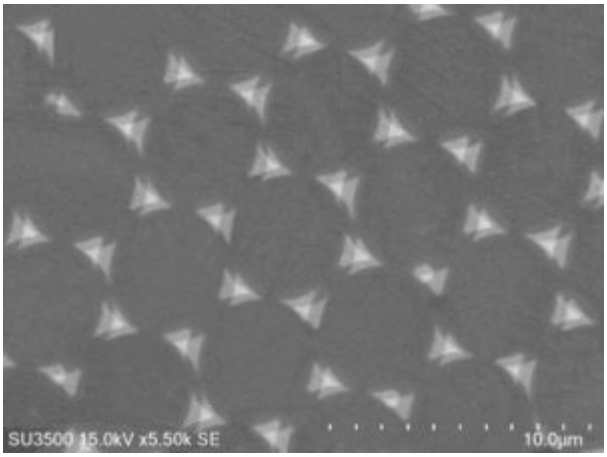
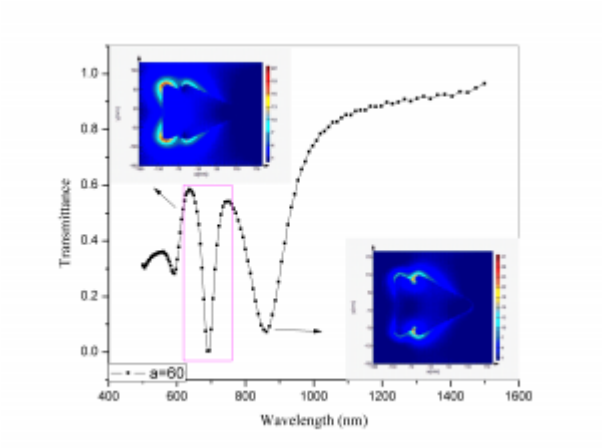
Our New paper in Journal of Superconductivity and Novel Magnetism

Congratulations for the publication of paper “Transverse Tunable Magneto-Plasmonic Kerr Effect in Large Area Micro-Patterned Au/Co/Au Structures” in the “Journal of Superconductivity and Novel Magnetism” by **S. M. Hamidi, S. Behjati, F. Sohrabi.**

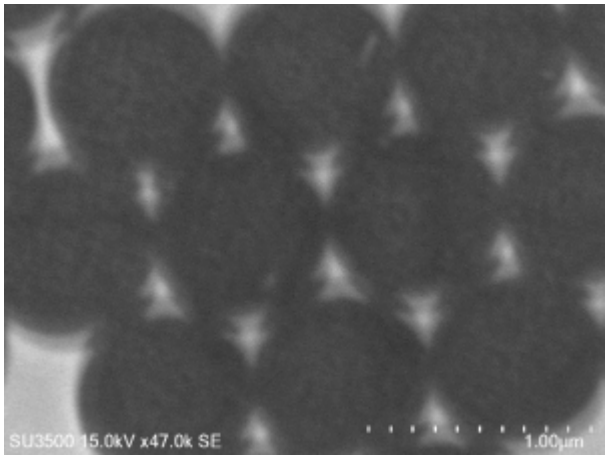


Our New Paper

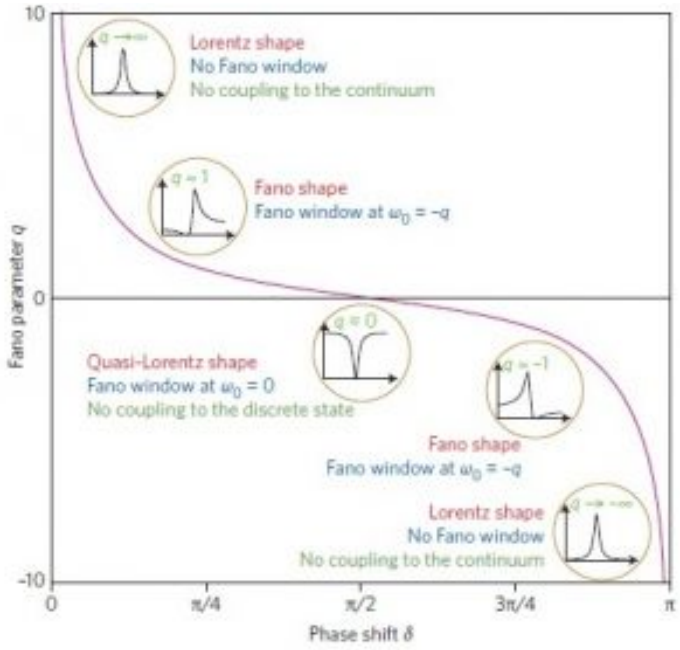




Congratulations for the publication of paper “Large area multi-channel plasmonic absorber based on the touching triangular dimers fabricated by angle controlled colloidal nanolithography” in the “Journal of optics and Laser Technology” by **S. M. Hamidi, S. Behjati.**



Fano resonances in photonics



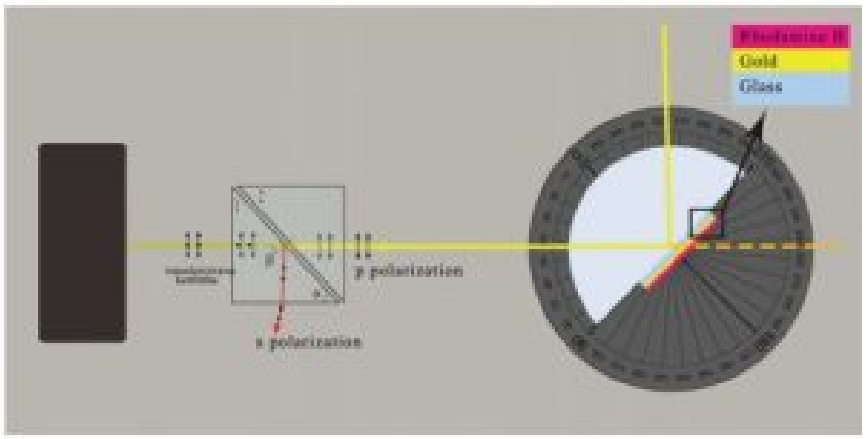
Rapid progress in photonics and nanotechnology brings many examples of resonant optical phenomena associated with the physics of Fano resonances, with applications in optical switching and sensing. For successful design of photonic devices, it is important to gain deep insight into different resonant phenomena and understand their connection. Here, they review a broad range of resonant electromagnetic effects by using two effective coupled oscillators, including the Fano resonance, electromagnetically induced transparency, Kerker and Borrmann effects, and parity–time symmetry breaking. they discuss how to introduce the Fano parameter for describing a transition between two seemingly different spectroscopic signatures associated with asymmetric Fano and symmetric Lorentzian shapes. they also review the recent results on Fano resonances in dielectric nanostructures and metasurfaces.

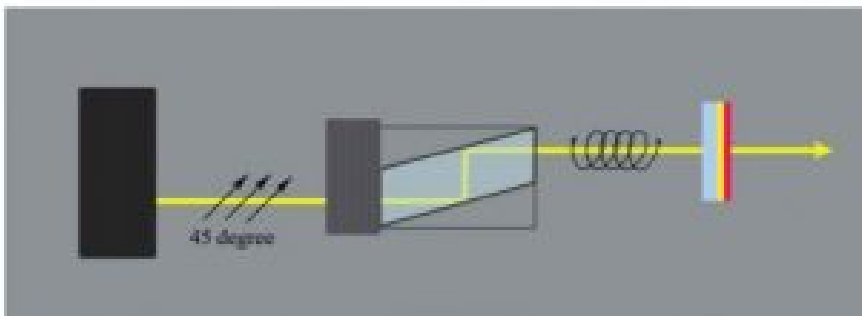
Source:
www.nature.com/nphoton/journal/v11/n9/full/nphoton.2017.142.html?foxtrotcallback=true

Related paper: Mikhail F. Limonov et al., Fano resonances in photonics, *Nature Photonics.*, 11,(2017).

Congratulations for the publication of paper “Plasmon- exciton induced circular dichroism in Gold/PMMA (RB) complex”

Congratulations for the publication of paper “Plasmon- exciton induced circular dichroism in Gold/PMMA (RB) complex” by **Dr Hamidi, Ms Jafari, Mr Behjati and Ms Sohrabi**.



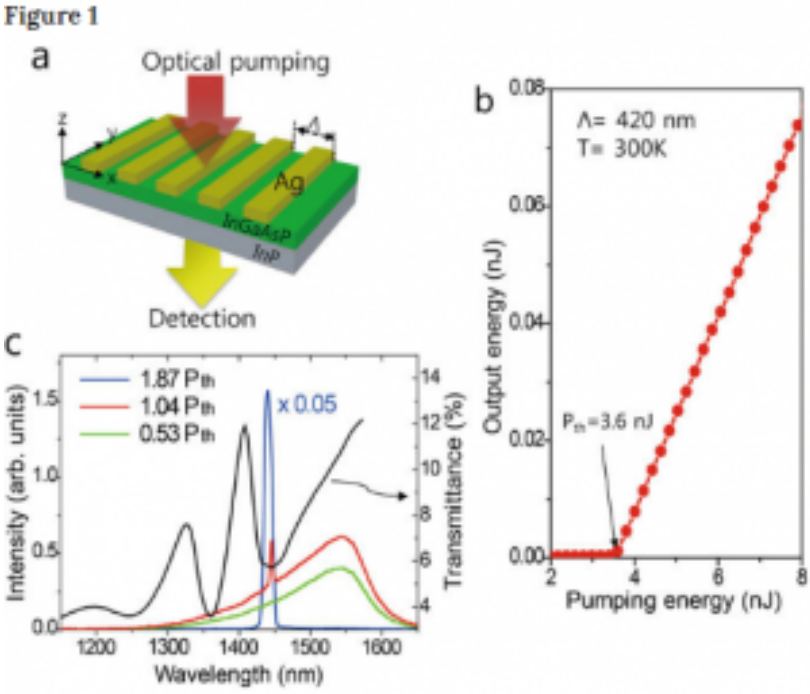


In this paper, we have investigated the strong coupling between exciton-plasmon by the aid of reflectance spectroscopy under different dye molecules weight in the samples. For this purpose, we have prepared five different samples as

Glass/Cr/Au/PMMA (RB_x); in which the weight of RB has been changed from 0 to 4 mg. The spectroscopy of the samples has been done under angular modulation and also the dispersion relation of the samples has been extracted from this measurement. These measurements revealed the formation of two split polaritonic extreme in reflectance spectra as a function of wavelength. Then we have shown exciton–plasmon coupling in dispersiondiagram which presented an extra allowed mode between the polaritonic branches. After that, the circular dichroism spectra of samples have been measured to see the strong coupling circular dichroism. Our results show that, we have significant change in the dichroism of gold thin film due to strong coupling in all of visible region.

Broadband Surface Plasmon Lasing in One-dimensional Metallic Gratings on Semiconductor

Figure 1



They report surface plasmon (SP) lasing in metal/semiconductor nanostructures, where one-dimensional periodic silver slit gratings are placed on top of an InGaAsP layer. The SP nature of the lasing is confirmed from the emission wavelength governed by the grating period, polarization analysis, spatial coherence, and comparison with the linear transmission. The excellent performance of the device as an SP source is demonstrated by its tunable emission in the 400-nm-wide telecom wavelength band at room temperature. They show that the stimulated emission enhanced by the Purcell effect enables successful SP lasing at high energies above the gap energy of the gain. They also discuss the dependence of the lasing efficiency on temperature, grating dimension, and type of metal.

Source:https://www.nature.com/articles/s41598-017-08355-6

Related paper: Seung-Hyun Kim et al.,Broadband Surface Plasmon Lasing in One-dimensional Metallic Gratings on Semiconductor, *Scientific Reports* **7**, Article number: 7907,(2017).

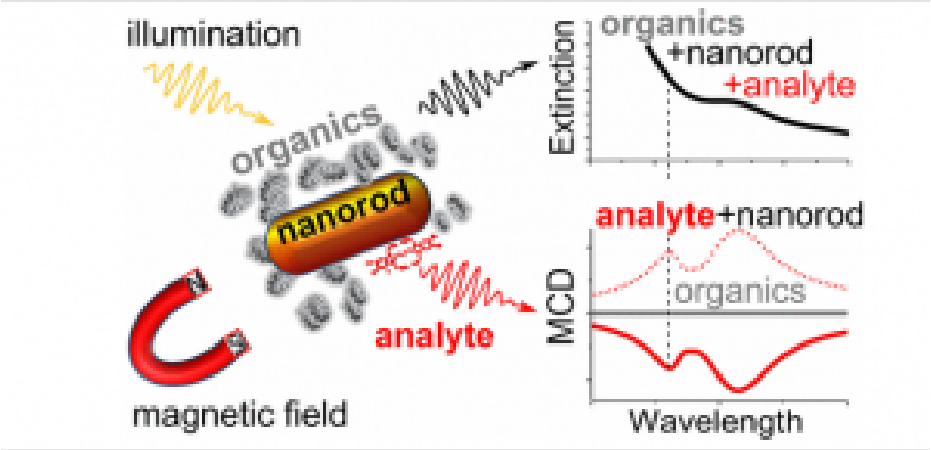
Congratulations on the acceptance of the paper “Localized to Propagating Surface Plasmon Resonance Transition in Ni-Au Magneto-Plasmonic Gratings”

The paper entitled **“Localized to Propagating Surface Plasmon Resonance Transition in Ni-Au Magneto-Plasmonic Gratings”** is written by Morteza Alizadeh Oskuie under the direct supervision of Dr Seyedeh Mehri Hamidi and it is accepted in the **journal of Superconductivity and novel magnetism**. The abstract is as follows:

Magneto-plasmonic structures, which are the best candidates for different applications, have been the subject of intense research in recent years. In this paper, we proposed new

magneto-plasmonic structures based on different uni-dimensional gratings to investigate the localized to propagative surface plasmon resonance transition. For this purpose, simulation of reflectance and also surface plasmon resonance coupling were used in three different fabricated samples compared with nickel thin film under different
azimuthaly excitations. The fabricated samples show an enhanced magneto-optical rotation due to the transition of two types of plasmon in the sample with intermediate dimensions. The prospects of magneto-plasmonic response dependency on the azimuthaly excitation are discussed.

Strong magneto-optical response of non-magnetic organic materials coupled to plasmonic nanostructures

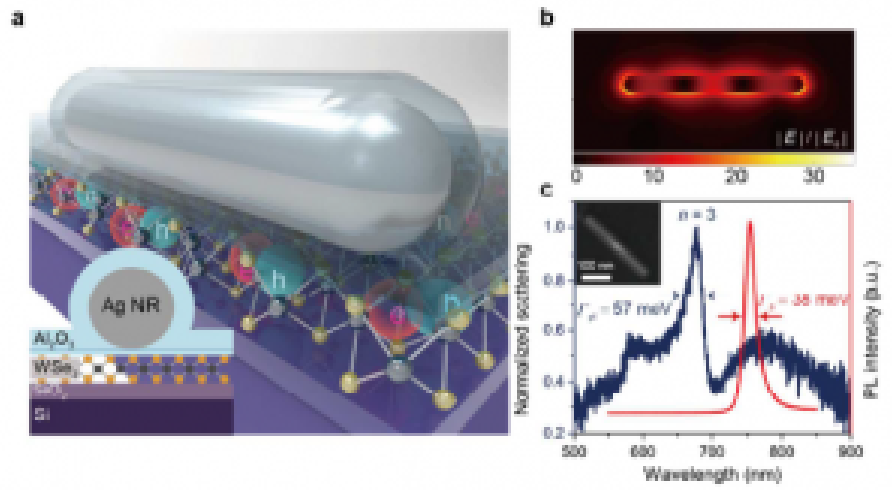


Plasmonic nanoparticles (PNPs) can significantly modify the optical properties of nearby organic molecules and thus present an attractive opportunity for sensing applications. However, the utilization of PNPs in conventional absorption, fluorescence, or Raman spectroscopy techniques is often ineffective due to strong absorption background and light scattering, particularly in the case of turbid solutions, cell suspensions, and biological tissues. Here they show that nonmagnetic organic molecules may exhibit magneto-optical response due to binding to a PNP. Specifically, they detect strong magnetic circular dichroism signal from supramolecular J-aggregates, a representative organic dye, upon binding to silver-coated gold nanorods. They explain this effect by strong coupling between the J-aggregate exciton and the nanoparticle plasmon, leading to the formation of a hybrid state in which the exciton effectively acquires magnetic properties from the plasmon. Their findings are fully corroborated by theoretical modeling and constitute a novel magnetic method for chemo- and biosensing, which (upon adequate PNP functionalization) is intrinsically insensitive to the organic background and thus offers a significant advantage over conventional spectroscopy techniques.

Source:http://pubs.acs.org/doi/abs/10.1021/acs.nanolett.6b05128

Related paper: Dzmitry Melnikau et al.,Strong Magneto-Optical Response of Nonmagnetic Organic Materials Coupled to Plasmonic Nanostructures,*Nano Lett.*, 17 (3), pp 1808–1813,(2017).

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



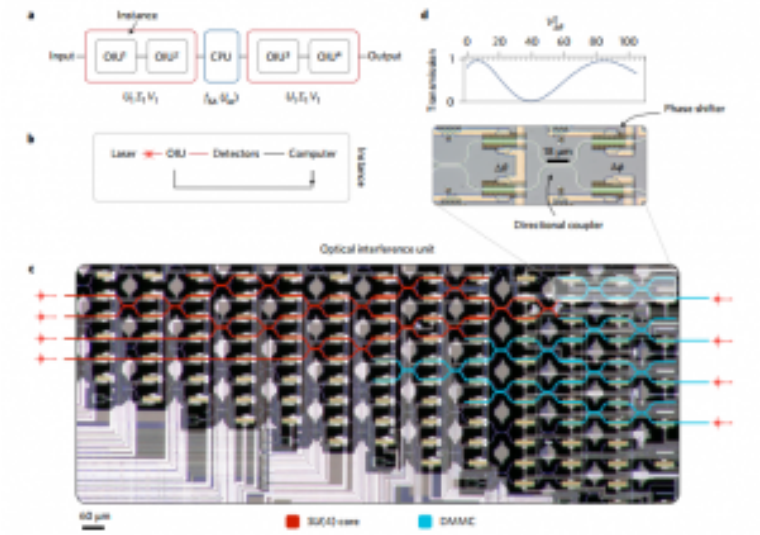
Strong coupling between plasmons and excitons in nanocavities can result in the
formation of hybrid plexcitonic states. Understanding the dispersion relation of plexcitons is important both for fundamental quantum science and for applications including optoelectronics and nonlinear optics devices. The 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).

Deep learning with coherent nanophotonic circuits



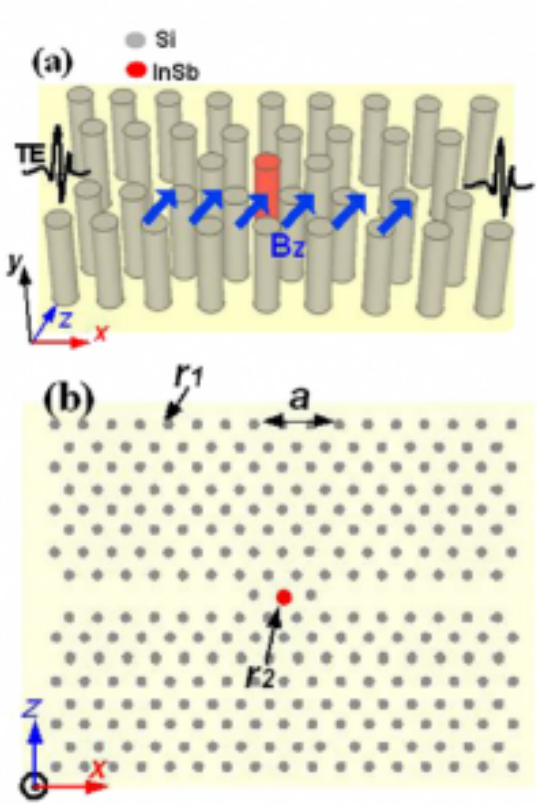
Artificial neural networks are computational network models inspired by signal processing in the brain. These models have dramatically improved performance for many machine-learning

tasks, including speech and image recognition. However, today's computing hardware is inefficient at implementing neural networks, in large part because much of it was designed for von Neumann computing schemes. Significant effort has been made towards developing electronic architectures tuned to implement artificial neural networks that exhibit improved computational speed and accuracy. Here, they propose a new architecture for a fully optical neural network that, in principle, could offer an enhancement in computational speed and power efficiency over state-of-the-art electronics for conventional inference tasks. They experimentally demonstrate the essential part of the concept using a programmable nanophotonic processor featuring a cascaded array of 56 programmable Mach–Zehnder interferometers in a silicon photonic integrated circuit and show its utility for vowel recognition.

Source:https://www.nature.com/nphoton/journal/v11/n7/abs/nphoton.2017.93.html

Related paper: Yichen Shen et al.,Deep learning with coherent nanophotonic circuits,Nature Photonics 11, 441–446 (2017)

Vertically magnetic-controlled THz modulator based on 2-Dmagnetized plasma photonic crystal



A novel magnetized plasma modulator for THz range is proposed. The structure is based on 2-D photoniccrystal (PC) constructed by triangular lattice of Si rods in air with line defects and an InSb rod as apoint defect. Based on the magneto-optic effect, the resonant frequency can be tuned by the externalmagnetic field and the radius of point defect. The transfer and disappearance of the PC-based mode canbe realized by utilizing a waveguide and a plasma cavity. The simulation results show that PC-based modedisappearance modulator has the potential for THz wireless broadband communication system with agood performance of high contrast ratio (<33.61 dB), low insertion loss (<0.36 dB) and high modulationrate (~4 GHz).

Source:http://www.sciencedirect.com/science/article/pii/S1569441016301250

Related paper: Wen Zhou et al.,Vertically magnetic-controlled THz modulator based on 2-D magnetized plasma photonic crystal,Photonics and Nanostructures – Fundamentals and Applications,Volume 23, February 2017, Pages 28–35,(2017).