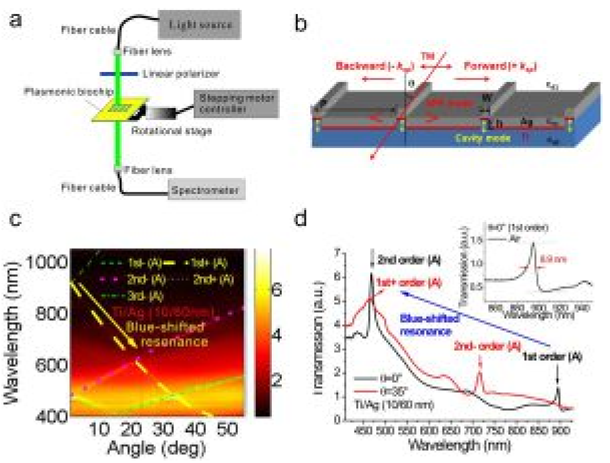
# [Enhancing Surface Sensing Sensitivity of Metallic Nanostructures using Blue-Shifted Surface Plasmon Mode and Fano Resonance]()

Improving surface sensitivities of nanostructure-based plasmonic sensors is an important issue to be addressed. Among the SPR measurements, the wavelength interrogation is commonly utilized. We proposed using blue-shifted surface plasmon mode and Fano resonance, caused by the coupling of a cavity mode (angle-independent) and the surface plasmon mode (angle-dependent) in a long-periodicity silver nanoslit array, to increase surface (wavelength) sensitivities of metallic nanostructures. It results in an improvement by at least a factor of 4 in the spectral shift as compared to sensors operated under normal incidence. The improved surface sensitivity was attributed to a high refractive index sensitivity and the decrease of plasmonic evanescent field caused by two effects, the Fano coupling and the blue-shifted resonance. These concepts can enhance the sensing capability and be applicable to various metallic nanostructures with periodicities.



Optical setup and optical properties of 900-nm-period Ti/Ag capped nanoslits with normal and oblique-angle incidence. (**a**) Optical setup for measuring angular transmission spectra. (**b**) Schematic configuration depicts the geometrical parameters of capped nanoslits with a 10-nm-thick titanium and 60-nm-thick silver film and the direction of the TM-polarized incident light. (**c**) Measured angular transmission diagram in air for 900-nm-period capped nanoslit arrays with a Ti/Ag film. The color dashed lines show the theoretical resonance wavelengths for the SPR mode. (**d**) Measured transmission spectra in air at 0° and 35° for 900-nm-period capped nanoslit arrays with a Ti/Ag film.

For more information: https://www.nature.com/articles/s41598-018-28122-5