

Plasmon enhanced spectral changes in nonlinear plasmonics

The resonant coupling of light and collective electron oscillations (plasmons) in noble metals, strongly enhances nonlinear optical responses of the medium in the vicinity of air-metal interfaces. We have recently shown—see the figure below—that the spectrum of resonantly enhanced sum-frequency pulses, generated upon reflection of an ultrashort pulse from a gold nano-film in the Kretschmann geometry, exhibits pronounced transformations at the incidence angle corresponding to the surface plasmon generation at the air-metal interface.

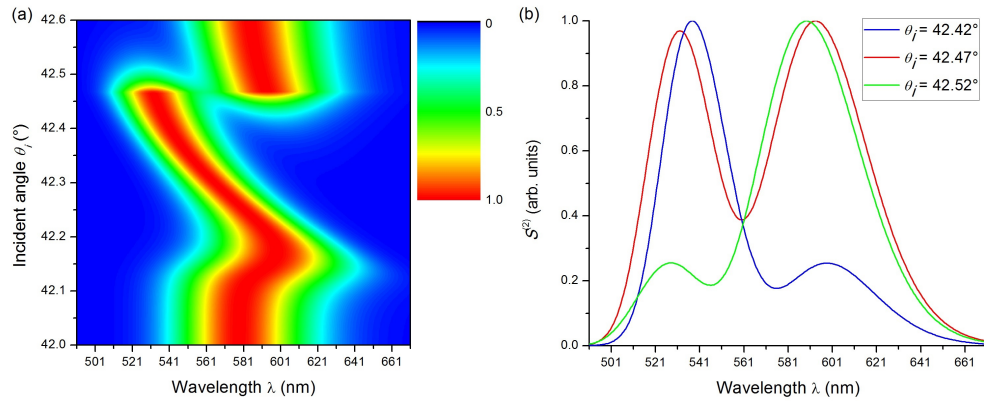


Fig. 1. (a) Sum-frequency pulse spectrum near plasmon resonance (b) The corresponding spectral switch.

Our results can be used in novel nonlinear spectroscopic modalities for biomedical applications and ultra-accurate sensing/investigation of surface impurities and generic surface morphologies.

References and links

1. L. Wang, F. Che, S. A. Ponomarenko, and Z. Z. Chen “Plasmon-enhanced spectral changes in surface sum-frequency generation with polychromatic light”, *Opt. Express*, **21**, 14159 (2013).
-