Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spectrally-selective THz plasmonic sensor based on thin InSb layer with metallic gratings[1] SHUAI LIN, Tulane Univ, KHAGENDRA BHATTARAI, JIANGFENG ZHOU, Univ of South Florida, DIYAR TALBAYEV, Tulane Univ — We present a novel terahertz plasmonic sensor based on metallic grating on micrometer-thin InSb layer. Two strong absorption modes are found computationally in the transmission spectra and we interpret them as standing surface plasmon modes by investigating the dispersion relations and the electric field spatial distribution of these two modes. We show that the dispersion of the plasmon modes is well explained by the air/InSb/air trilayer theory of surface plasma waves. This structure is very sensitive to the dielectric environment and the analyte (eg. lactose) at the InSb interface, which shows the capability as a terahertz plasmonic sensor. The sensitivity is determined to exceed 0.2 THz per refractive index unit. We demonstrate the splitting of the plasmonic mode as we tune it in resonance with the lactose vibrational mode at 1.37THz, which indicates that the structure is a potential candidate for a new sensing modality that allows direct detection of terahertz vibrational fingerprints of an analyte.

[1]Alfred P. Sloan Foundation (BR2013-123); KRISS (GP2016-034); NSF DMR 1554866

Shuai Lin
Tulane Univ

Date submitted: 09 Nov 2016 Electronic form version 1.4