Photo-induced Voltage on the Metal-Dielectric-Metal Multilayer with Periodic Hole Array.

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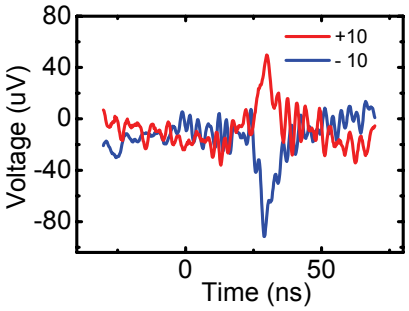
Negative index of refraction has been reported in rather simple structure of metal-dielectric-metal layered structure with air-holes which are arranged into periodic square lattice [1]. Unlike the other NIM structures, the electric polarization induced by the light irradiation may be measured as voltage because each metallic sheet is electrically connected.



Here we report first observation of photo-induced voltage in MIM structure with a period of 600nm. Below the diffraction threshold, a mode appears as a transmission maximum which shifts to the lower energy as the angle increases. Figure shows oscilloscope traces of photo-induced voltage observed for incident angle of 10 and -10 degree with about 1MW/cm^2 laser pulse at 1.5 μm. We compare the experimental observation with numerical calculations based on scattering matrix method on transmission spectra and photo-induced voltage derived from DC force distribution inside of the structure.

[1] S. Zhang, *et al*, Phys. Rev. Lett. **95**, 137404 (2005)