Broadband THz wave generation with metamaterials demonstrated

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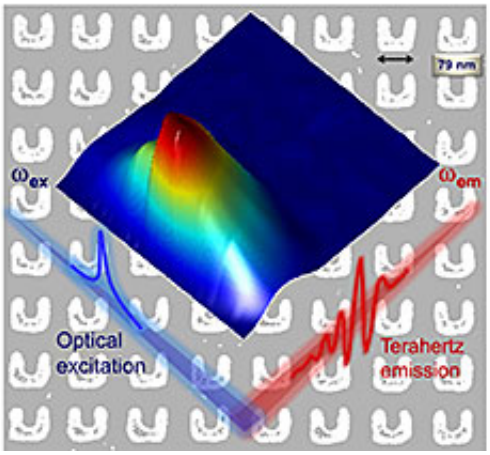

A team led by Ames Laboratory physicists demonstrated broadband, gapless terahertz emission (red line) from split-ring resonator metamaterials (background) in the telecomm wavelength. The THz emission spectra exhibit significant enhancement at magnetic-dipole resonance of the metamaterials emitter (shown in inset image). This approach has potential to generate gapless spectrum covering the entire THz band, which is key to developing practical THz technologies and to exploring fundamental understanding of optics.

Scientists at DOE's Ames Laboratory have demonstrated broadband terahertz (THz) wave generation using metamaterials.

The discovery may help develop noninvasive imaging and sensing, and make possible THz-speed information communication, processing and

storage.

The team created a metamaterial made up of a special type of meta-atom called split-ring resonators.

Split-ring resonators, because of their u-shaped design, display a strong magnetic response to any desired frequency waves in the THz to infrared spectrum.

They demonstrated their technique using the wavelength used by telecommunications (1.5 microns), but the THz generation can be tailored simply by tuning the size of the meta-atoms in the metamaterial.

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