Efficient Terahertz Sources Based on Difference-frequency Generation in Triply-resonant Photonic Resonators

Technology #13834

Applications

Applications for this technology span a variety of industries that would benefit from having a small-footprint and efficient THz source operating at room temperature, including non-destructive material characterization, biology and medical imaging, environmental monitoring, homeland security (security screening), and ultrafast computing.

Problem Addressed

The current technologies are not as adept in efficient conversion at low powers. Current technologies for efficient THz generation require either operation at cryogenic temperature or, if one needs to operate at room temperature, intricate set-ups and powerful lasers (both possibilities lead to not practical and not compact THz sources).

Technology

The invention is a system for efficient terahertz (THz) generation based on difference-frequency generation in a triply-resonant photonic resonator. The system includes a photonic resonator comprising at least one nonlinear material that enables THz generation via difference-frequency generation (DFG) of two near-infrared (NIR) or optical beams. This photonic resonator is coupled evanescently to at least one NIT or optical waveguide and is embedded or placed in the proximity of a second photonic resonator, whose resonant frequency is in the THz waveguide.

Advantages

- Allows for efficient nonlinear frequency conversion at low powers
- Provides a THz source that, while being compact and efficient, can operate at room temperature (i.e., it meets all the requirements of a truly practical THz source)
- The THz source has the potential of enabling a broader use of THz radiation

Categories For This Invention:

Networks & Systems
Security
Photonics
Sensors (Photonics)
Imagers
Life Sciences
Imaging

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Intellectual Property:

Efficient terahertz sources based on difference-frequency generation in triply-resonant photonic resonators
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http://www.rle.mit.edu/marin/
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Nanostructures and Computation
http://math.mit.edu/~stevenj/

Image Gallery:

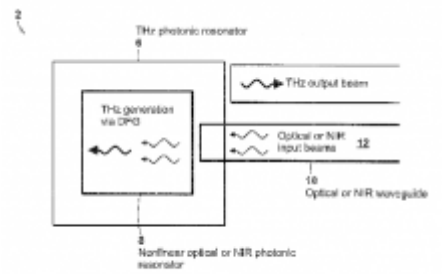

FIG. 1A

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