Recent achievements in the THz super-resolution endoscopy and tunable optical element designing

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Over the recent years, we have introduced a range of materials for the design of THz (terahertz) optical elements. These materials include sapphire-shaped crystals, which possess desirable attributes for low-loss THz wave delivery and single-walled carbon nanotube with high conductivity.

We have explored the utility of using waveguides, fibers, and fiber bundles based on these sapphire-shaped crystals. Such structures are suitable for tasks involving the efficient transmission of radiation with minimal loss and for applications in superresolution imaging [1-3]. In a recent development, we have successfully designed hollow-core THz waveguides that incorporate polymer cladding. These waveguides serve to manipulate the angular distribution of a two-color laser-generated air plasma emitter [4]. Furthermore, by integrating these waveguides with sapphire solid immersion lenses, we have made advancements in the creation of an endoscopic system [5]. This system demonstrates a spatial resolution of approximately 0.19 times the wavelength (λ).

The new approach for the creation of mechanically tunable focusing element in the THz range could be presented. Single-walled carbon nanotube (SWCNT) thin film was transferd on the stretchable polymer and 50% change in focus length was archved [6].

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