

Structured light produces helical materials and beyond

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Abstract. We review light induced helical materials and beyond. Structured light fields with an orbital angular momentum (OAM) originated from their helical wavefronts enable us to twist the irradiated materials, including metal, silicon, polymer, and even liquid-phase resin, to form a myriad of nano/micro-scale helical structures. Such light induced helical structures should offer new advanced material sciences and technologies.

Keywords: Orbital Angular Momentum of Light, Structured Materials, Laser Materials Processing, Chirality, Structured light fields, Optical vortex

Structured light, *i.e.*, optical vortex, possesses a ring-shaped spatial form and an orbital angular momentum (OAM) originated from its helical wavefront, and it has been exploring a myriad of research fields, such as optical manipulations, space division multiplexing optical communications, and optical storages with the freedom of OAM.

In recent years, we and our co-workers discovered that the structured light fields twist the irradiated materials to form nano/micro-scale helical structures, manifesting helical wavefronts of the irradiated structured light fields.

Such light induced nano/micro-scale helical structures will pave the avenue towards new advanced material sciences and technologies: For instance, they may act as a generator of sub-wavelength-scale nearfield OAM fields for manipulating the handedness and orientation of aggregation of molecules. Furthermore, they will act as a waveguide for structured light fields themselves.

In this presentation, we review light induced helical structures and beyond, and their applications towards advanced materials science and engineering.

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