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3D Photonic Metamaterials Made by Direct Laser Writing

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Over the last decade, direct laser writing (DLW) has matured from a laboratory curiosity to a commercially available technology that can be viewed as the three-dimensional analogue of two-dimensional electron-beam lithography. In DLW, lateral line widths down to about 100 nm (at 800 nm laser wavelength) have become routine. Even diffraction-unlimited DLW using stimulated emission depletion (STED) appears to be in reach. In this talk, we emphasize applications of DLW regarding fabrication of three-dimensional metamaterials operating at optical frequencies. Recent examples are (i) gold-helix metamaterials that can serve as compact, broadband circular polarizers, (ii) bi-chiral helical structures, and (iii) complex three-dimensional transformation-optics nanostructures (carpet cloaks).