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Meta-Optics

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As the fields of metamaterial and plasmonic nanophotonics reach certain levels of development, new directions and novel vistas appear in the horizon. Modularization, parameterization and functionalization of metamaterials may be exploited to provide new functionalities and applications stemming from such interesting platforms of "meta-optics." Indeed, the metamaterial "forms" may lead to novel "functions." These may include metamaterial "bits" and "bytes" as building blocks for digitizing metamaterials, "optical metatronics" – metamaterial-inspired optical nanocircuitry – formed by judicious arrangement of nanostructures capable of optical processing at the nanoscale, "meta-systems" formed by metamaterials and metasurfaces providing wave-based signal handling and processing, graphene metatronics as one-atom-thick mid IR circuits, and nonreciprocal metastructures for unusual control over flow of photons, to name a few. We are exploring various features and characteristics of these concepts, topics, and directions in the paradigms of meta-optics and are investigating new classes of potential applications such paradigms may provide. We will present an overview of our most recent results from a sample of these topics and will discuss future directions and potentials.