

Abstract

This doctoral thesis provides a comprehensive exploration of optical and photonic metasurfaces, emphasizing their design, fabrication, and characterization. It delves into the innovative realm of manipulating light at the nanoscale through metasurfaces, a transformative approach that offers a versatile platform for tailoring electromagnetic wave behavior. The research encompasses a rigorous analysis of metalenses, large area metasurfaces, resonances in nanopillar structures, and organic metasurfaces contributing significantly to the field by addressing gaps in current understanding and presenting novel material characterization methods, systemic design techniques, and advanced fabrication strategies. Through this work, the thesis aims to enhance the knowledge and application of metasurface technologies, offering new perspectives for future technological developments in photonics and optical technologies.