

Development and Applications of Three-Dimensional Nanoimprint Technology

S. W. Pang

Department of Electrical Engineering

Center for Biosystems, Neuroscience, and Nanotechnology

City University of Hong Kong, Hong Kong, China

pang@cityu.edu.hk

Recent advancements in nanotechnology have facilitated the creation of diverse nanostructures, which are essential for high-performance biosensors, terahertz (THz) devices, and metamaterials. Nanoimprint technology, when integrated with precise dry etching techniques, enables the rapid production of three-dimensional (3D) nanodevices with high uniformity and precisely controlled dimensions over large areas. In this presentation, we will demonstrate the technology of stacking multiple layers to construct 3D devices with flexible designs. Furthermore, we will explore several applications of 3D nanoimprint technology. These applications include 3D biomimetic platforms and plasmonic biosensors designed to control and monitor cells and biomolecules with exceptional sensitivity, high-frequency THz lenses and antennas that utilize curved or meta surfaces to enhance functionality and performance, and multiple-layered meta surfaces with twist angles engineered to achieve chiral magic angles for advanced light manipulation.