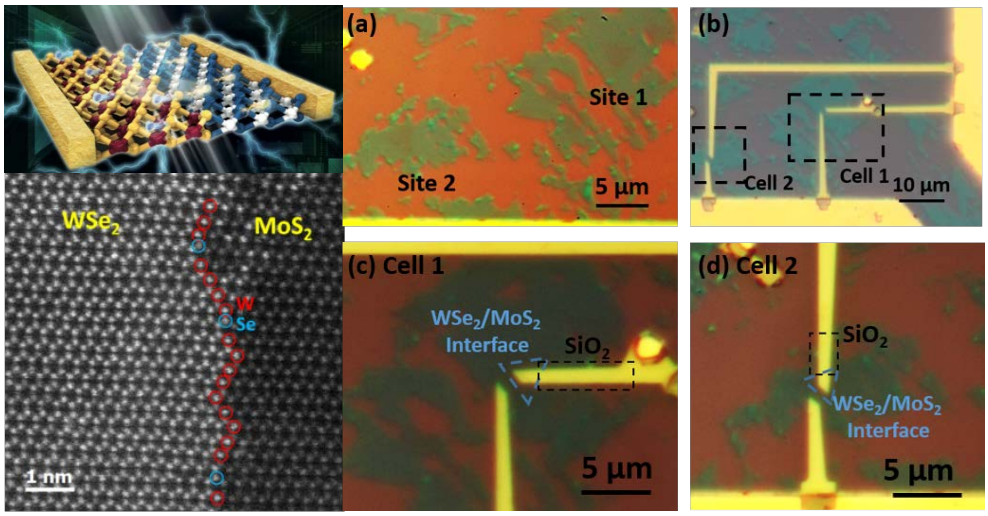
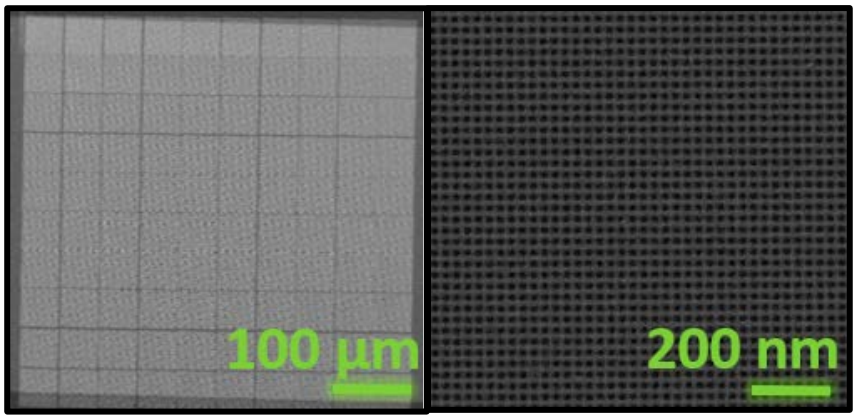
Prof. Meng-Lin Tsai
(Nano Optoelectronics Lab)

1. Growth, synthesis, and device fabrication of nanomaterials



Based on the past experiences in the fabrication of nanomaterial devices including 2D monolayers, 1D nanowires, and 0D quantum dots, we will focus on the development of new types of novel materials such as inorganic perovskite quantum dots, 2D lateral heterojunction devices, and functional core-shell nanowires in the next several years. The research will include material growth/synthesis and characterization, device fabrication, and device measurement/characterization. Our target is to grow high quality materials and develop electronic nanodevices with performance comparable to conventional devices and with mass production possibility.

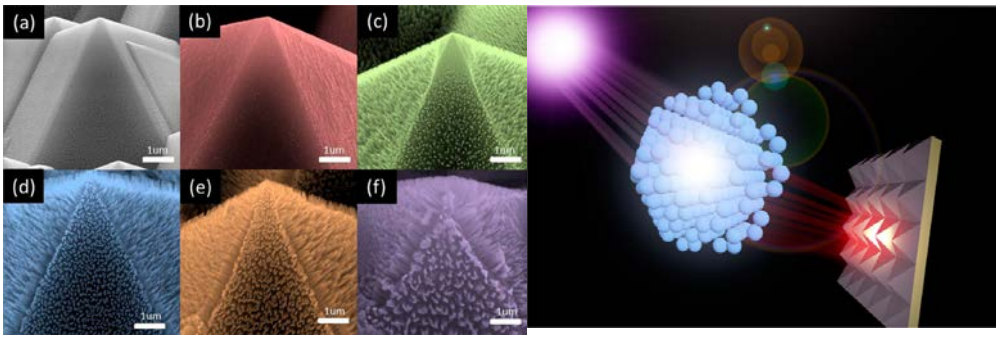
2. Electron-beam lithography technology



Electron-beam lithography technology is critical in the fabrication of nanodevices as well as the design of photonic crystals. In the past, we have achieved a resolution of ~30 nm for constructing a 0.5 mm × 0.5 mm large-

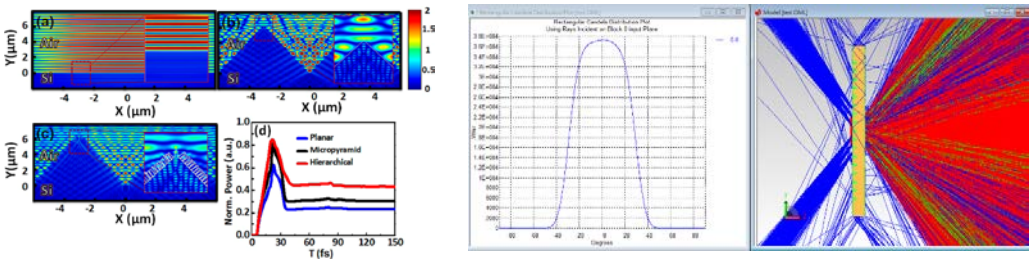
size structure. Our target is to continue improving the resolution and develop lithography techniques for various organic (unstable) material-based devices.

3. Organic-inorganic hybrid solar cells



The efficiency of organic-inorganic hybrid solar cells such as Si/PEDOT:PSS or perovskite have improved significantly over the past few years. However, the stability problem remained limits their potential for practical application. We are interested in using chemical or physical strategies to further improve the stability and lifetime of these types of cells.

4. Optical design and simulation



Optical simulation (classical/Fourier optics) plays an important role in the study of micro/nanostructures, optical waveguides, to display/lighting-related applications. We are interested in constructing various optical design to improve the performance of our device.