SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING
Website: https://cde.nus.edu.sg/ece

Area: Microelectronic Technologies & Devices (MTD)

Host: Prof. Chen Xudong

TOPIC	:	**Realization of high efficiency metagrating for large angle beam deflection**
SPEAKER	:	**Mr. Ye Taikang** **Graduate Student, ECE Dept, NUS**
DATE	:	**Tuesday, 27 February 2024**
TIME	:	**2:00PM-2:30PM**
VENUE	:	**Zoom Meeting** **https://nus-sg.zoom.us/j/86566739141?pwd=YlkzMzdjV2NOeG4xaGRuU3RobTEydz09** **Meeting ID: 865 6673 9141** **Password: 932212**

ABSTRACT

Directional emission source is one of the key components for multiple-view three-dimensional display. It is hard to achieve high efficiency and large deflection angle direction sources via geometric optics due to the weak confinement of light. The metasurface especially metagrating provides a promising method to control light effectively. However, the conventional forward design methods for metasurface are inherently limited by insufficient control of Bloch modes, which causes a significant efficiency drop at a large deflection angle. Here, we will present a high efficiency large deflection angle metagratings by realizing the constructive interferences among the propagation Bloch modes and enhancing the outcoupling effect at the desired diffraction order. The grating structures that support the coupling of Bloch modes were designed by an inverse design method for different incident wavelengths, and the total phase response of a supercell can be tailored. For a red (620 nm) incident light, the theoretical deflection efficiency of a silicon metagrating can be higher than 80% from 30° to 80°. The experimental deflection efficiency can achieve 86.43% for a 75° deflection metagrating. The matched simulation and experimental results strongly support the reliability of developed algorithm. Our inverse design approach could be extended to the green (530 nm) and blue (460 nm) incident light with titanium dioxide metagratings, with theoretical deflection efficiency of over 80% in a large deflection angle range of 30° to 80°. Considering the multiple visible wavelength deflection capability, the presented algorithm can be potentially applied for full color three-dimensional display, and other functional metagrating devices based on different dielectric materials.

BIOGRAPHY

Mr. Ye Taikang is currently working towards his Ph.D. degree in Electrical and Computer Engineering at National University of Singapore. His research interests mainly focus on nano-phonics devices design and its application in display.

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