

Monolithic Integration of III-Nitrides Optoelectronics

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The III-nitride family (AlN, GaN, InN, and their alloys) has been regarded as one of the most significant semiconductors, and has therefore been heavily investigated in the past two decades for various optoelectronics (light emitting diodes, lasers, photodetectors, etc.). Excitingly, the InGaN-based light emitters have revolutionized the lighting industry, promoting energy-efficient and eco-friendly modern solid-state lighting and lasing technologies. Similarly, by alloying GaN with AlN, we can synthesize AlGaN ternary alloys with tunable direct bandgaps from 3.4 eV (GaN) to 6.1 eV (AlN), corresponding to a wide UV spectral range from 360 nm to 210 nm, for a broad range of applications including air/water purification, UV curing, data storage, optical communication, etc. Hence, the AlGaN alloys have attracted enormous attention in the nitride community for use in efficient AlGaN-based UV LED, lasers and photodetectors. In this presentation, we will focus on the development of AlGaN-based highly efficient UV LEDs and detectors with monolithic integration of these optoelectronics on silicon platform for on-chip and free-space optical communications.



Short Bio:

Prof. Haiding Sun received his Ph.D. in Electrical Engineering from Boston University. He is now a Professor in the School of Microelectronics at University of Science and Technology of China, leading the iGaN Lab for the investigation of the physics, epitaxy, fabrication, and characterization of wide bandgap semiconductor materials based on group III-Nitrides for both optoelectronics and electronic devices. He has published more than 140 peer-reviewed SCI-index journal papers including Nature Electronics, Nature Photonics, Light, Advanced Materials/Advanced

Functional Materials, ACS Nano/Nano Letters, Laser & Photonics Review etc. He has written 4 book chapters and holds 20+ Patents. His work has been highlighted by more than 100 times in many media outlets including *Compound Semiconductors*, *Semiconductors Today*, *Phys.org*, etc. He is an IEEE Senior Member and currently Associated Editor of IEEE Photonics Technology Letters, Journal of Semiconductors etc.