Workshop on MBE for Emerging Emitter Technologies
Room Tamaya ABC - Session WME2-SaM

Emerging Materials and Growth Technologies

Moderator: Carolina Adamo, Northrop Grumman

10:30am **WME2-SaM-11 Clean Oxides at High Temperatures**, ***Joseph Falson***, California Institute of Technology **INVITED**

In this presentation I will discuss recent developments in the epitaxy of ultra-pure ZnO as a platform for emerging emitters. Using clean homoepitaxial layers we have investigated a range of extrinsic defects as well as implanted ions inside ZnO as the host lattice. I will provide an outlook on the current status of developing method for in-situ incorporation of the most promising varieties of defects, as well as approaches to improving their quantum lifetimes through dilution of the nuclear spin bath. If time permits, I will also discuss other novel oxides which can be grown using similar techniques to very high purity.

11:00am **WME2-SaM-13 Dislocation-Tolerant Quantum Dot Light Emitters: From Growth on Silicon to Remote Epitaxy**, ***Minjoo Larry Lee***, University of Illinois at Urbana-Champaign **INVITED**

InAs quantum dots (QDs) grown on GaAs/Si have emerged as a compelling active region for reliable monolithically integrated lasers on Si with emission around 1200-1300 nm. In 2020, my group demonstrated that InP QDs also show promise as dislocation-tolerant light emitters with tunable emission in the red visible wavelength range. Since then, we have demonstrated InP QD visible lasers on both GaP/Si templates and patterned photonic integrated circuit (PIC) templates. More recently, we have demonstrated InP QD visible light-emitting diodes on GaAs templates grown by remote epitaxy, which can also exhibit escalated dislocation densities. In this talk, I will review these directions and also describe new results from my group on InAsP QDs, which promise tunable emission in the near-infrared spectral range from 750-1200 nm. The potential to grow dislocation-tolerant InAsP light emitters spanning from 650-1300 nm could open a range of new applications, ranging from sensing to quantum technology.

11:30am **WME2-SaM-15 Thermal Laser Epitaxy for Emerging Emitter Materials**, ***Brendan Faeth***, epiray **INVITED**

As the scope of both technological demand and known material systems continues to expand, the need for greater variety and control of constituent sources has begun to strain the capabilities of conventional deposition techniques.Here, we demonstrate a new thin-film deposition technique, Thermal Laser Epitaxy (TLE), which combines IR laser heating of elemental sources with direct CO_2 laser heating of substrates.This approach allows for the evaporation of practically all elements of the periodic table in the same setup, while maintaining even extremely corrosive process gas environments up to pressures as high as 10^{-1} mbar, and at extremely high substrate temperatures. Here, I will introduce and discuss the advantages of TLE for epitaxy, with a focus on applications for emerging emitter materials across a wide range of materials families including oxides, nitrides, and other more exotic opportunities not accessible by conventional MBE approaches.

12:00pm **WME2-SaM-17 Panel Discussion**,

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