**Dayrl Briggs**

Lead Cleanroom Engineer/Lab Space Manager

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**Education**

RETS Electronics Institute, Birmingham, Al. Electronics Engineering A.A.S., 1986

**Professional Experience**

2006–Present Lead Cleanroom Engineer, Lab Space Manager

Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

2006 Equipment Maintenance Manager, Ion Implant/Diffusion,Intel Corp., Fab 23, Colorado Springs, CO

2003–2006 Mechanical Engineering Vacuum Group, Spallation Neutron Source, Oak Ridge National Laboratory

1997–2003 Equipment Engineering Manager, Equipment Engineer, Ion Implant/Diffusion/CVD**,** Vitesse Semiconductor, Fab 2, Colorado Springs, CO

1990–1997 Equipment Engineering Technician, Diffusion/CVD, Atmel Semiconductor Corp., Fab 3, 4, and 5, Colorado Springs, CO

1986–1990 Equipment Engineering Technician, Diffusion/CVD**,** Texas Instruments,DMOS-IV,Dallas, TX

**Expertise**

**Cleanroom Technical Operations**

* + Manage the daily operation of the NRL Cleanroom.
  + Facilitate compliance with relevant environment, safety, security, health, and quality (ESSH&Q) requirements.
  + Demonstrate and foster a strong safety culture and encourage the practice of the safe conduct of research.
  + Ensure that all work is conducted in accordance with safety and security requirements.
  + Provide initial cleanroom safety training and orientation for new Users who will be working in the cleanroom.
  + Provide individual tool training for Users.

**Equipment Engineering**

* Emphasis on cleanroom startups, safety systems, process gas distribution design and layout, equipment layout, equipment procurement, installation, modification, repair and maintenance.
* Collaborate with facilities, building engineering, skilled crafts, to ensure proper operation of cleanroom support systems such as ultra-pure water, equipment cooling water, air handlers, humidity, temperature, and pressure control systems.

**Process Engineering**

* Provide process engineering, process development, characterization and control in the NRL Cleanroom.
* Growth of high purity thermal silicon dioxide (SiO2) thin films on silicon substrates in an atmospheric horizontal tube furnace.
* Low Pressure Chemical Vapor Deposition (LPCVD) of stoichiometric silicon nitride (Si3N4) or low stress non-stoichiometric silicon nitride. Film stress and/or stoichiometry tuned for specific applications.
* LPCVD deposition of intrinsic poly-silicon, doped poly-silicon (N-Type), amorphous silicon, low temperature silicon oxide (LTO), and doped oxides such as borophosphosilicate glass (BPSG) and phosphosilicate glass (PSG).
* Plasma Enhanced Chemical Deposition (PECVD) of silicon oxide, oxy-nitride, and silicon nitride thin films on single wafer samples. Porous room temperature silicon oxide deposition. Film stress and/or stoichiometry tuned for specific applications.
* Atomic Layer Deposition (ALD): The ALD process is a true “nano” technology allowing for precise deposition of ultra-thin films of a few nanometers in thickness. The two defining characteristics of ALD are self-limiting layer by layer growth and highly conformal coating of extreme high aspect ratio topography. Plasma capability allows for ALD processing temperatures as low as 30oC. A variety of materials characterized.
* Rapid Thermal Processor (RTP). This tool is an infrared lamp heating system capable of controlled ramp rates or rapid maximum ramp rates approaching 100oC per second. Samples can be heated in excess of 1200oC in various ambient conditions and pressures ranging from 10mTorr to atmospheric pressure. The RTP can be used to modify the functional properties of substrates and thin films. A variety of custom process parameters can be developed as required.
* Inductively Coupled Plasma (ICP) Deep Reactive Ion Etching (DRIE) and pattering of a variety of materials including silicon, silicon dioxide, silicon nitride, compound semiconductor materials, 2D materials. Bosch etch , through-wafer Bosch etch, cryogenic etching or anisotropic etching.

**Select Peer-Reviewed Publications**

1. Ma, Yunwei, et al. 1 kV Self-Aligned Vertical GaN Superjunction Diode. IEEE Electron Device Letters (2024) doi: 10.1109/LED.2023.3332855
2. Vlassiouk, I. et al. Armor for Steel: Facile Synthesis of Hexagonal Boron Nitride Films on Various Substrates. Advanced Materials Interfaces (2023) <https://doi.org/10.1002/admi.202300704>
3. Fried, Jasper P. et al. Understanding Electrical Conduction and Nanopore Formation During Controlled Breakdown. Small (2021)  <https://doi.org/10.1002/smll.202102543>
4. Oyedele, Akinola D. et al. Defect-Mediated Phase Transformation in Anisotropic Two-Dimensional PdSe2 Crystals for Seamless Electrical Contacts. *J. Am. Chem. Soc.* (2019) <https://doi.org/10.1021/jacs.9b02593>
5. Pudasaini, Pushpa R. et al. High performance top-gated multilayer WSe2 field effect transistors. Nanotechnology (2017) **DOI** 10.1088/1361-6528/aa8081
6. Yang, Y.; Kravchenko, I. I.; Briggs; D. P.; Valentine, J., “All-Dielectric Metasurface Analogue of Electromagnetically Induced Transparency,” Nat. Commun., 5, 5753 (2014).
7. Moitra, P.; Slovick, B. A.; Li, W.; Kravchenko, I. I.; Briggs, D. P.; Krishnamurthy, S.; Valentine, J., “Large-Scale All-Dielectric Metamaterial Perfect Reflectors,” ACS Photonics, 2, 692–69 (2015).
8. Wang, W.; Klots, A.; Yang, Y.; Li, W.; Kravchenko, I. I.; Briggs, D. P.; Kirill I. Bolotin, K. I.; Valentine, J., “Enhanced Absorption in Two-Dimensional Materials via Fano-resonant Photonic Crystals,” Applied Physics Letters, 106, 181104 (2015).
9. Yuanmu; Y.; Wenyi; W.; Boulesbaa,A.; Kravchenko, I.; Briggs, D.; Puretzky, A.; Geohegan, D.; Valentine, J. G., “Nonlinear Fano-Resonant Dielectric Metasurfaces,” Nano Lett., 15, 7388 (2015).
10. Agapov, R. L.; Boreyko, J. B.; Briggs, D. P.; Srijanto, B. R.; Retterer, S. T.; Colliera, C. P.; Lavrik, N. V., “Length Scale Selects Directionality of Droplets on Vibrating Pillar Ratchet,” Advanced Materials Interfaces, 1, 1400337 (2014).