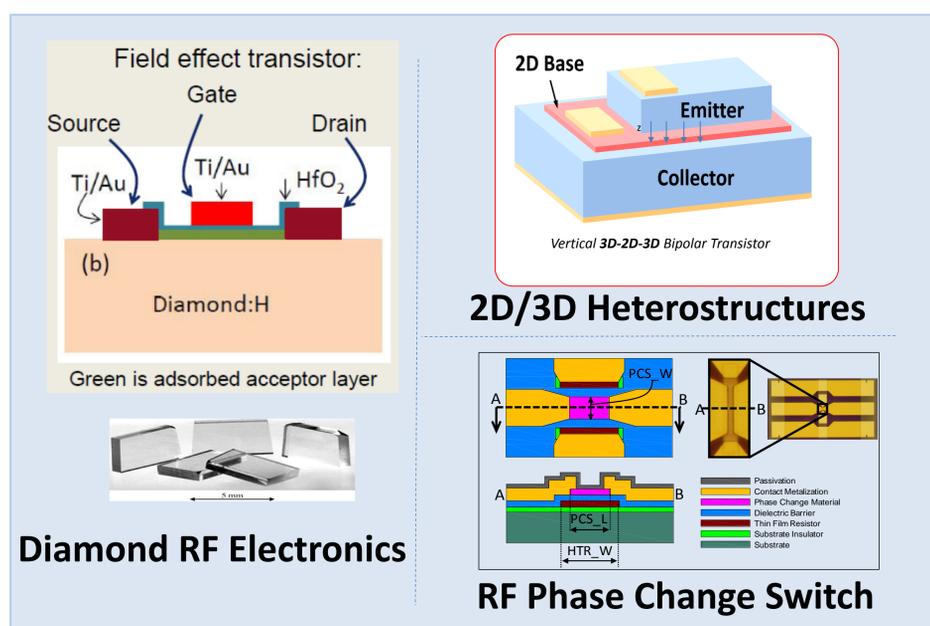


## S&T Campaign: Materials Research Electronics Energy Efficient

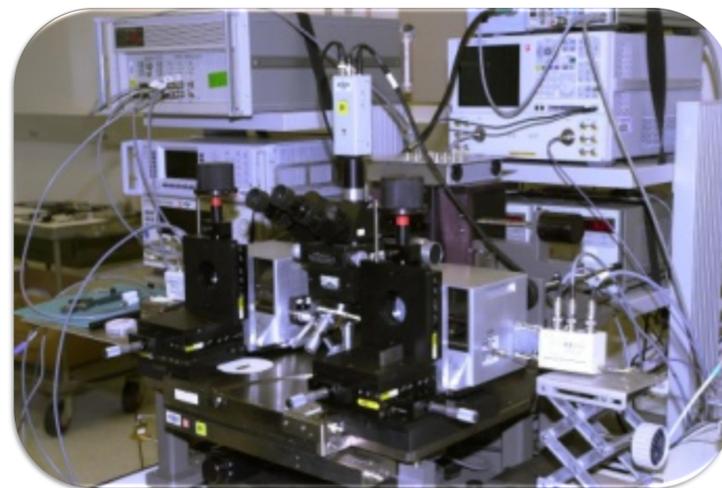
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## Research Objective

- Provide substantial energy efficiency improvement in high speed (RF) electronics to reduce power draw; increase mission duration; and reduce logistics tail
- Investigate devices that exploit emerging electronic materials such as 2D transition metal dichalcogenides, phase change materials, and diamond-based devices



## ARL Facilities and Capabilities Available to Support Collaborative Research



RF Characterization



Combined AFM+Raman



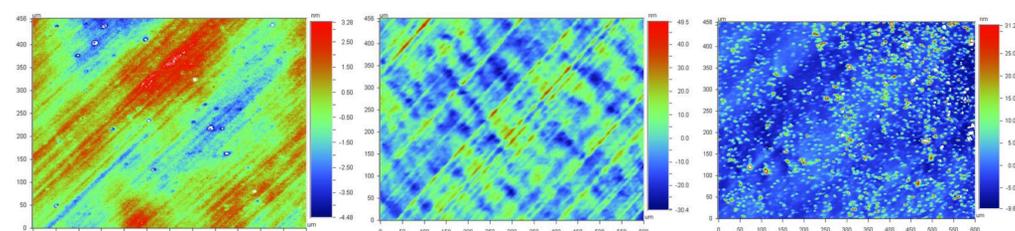
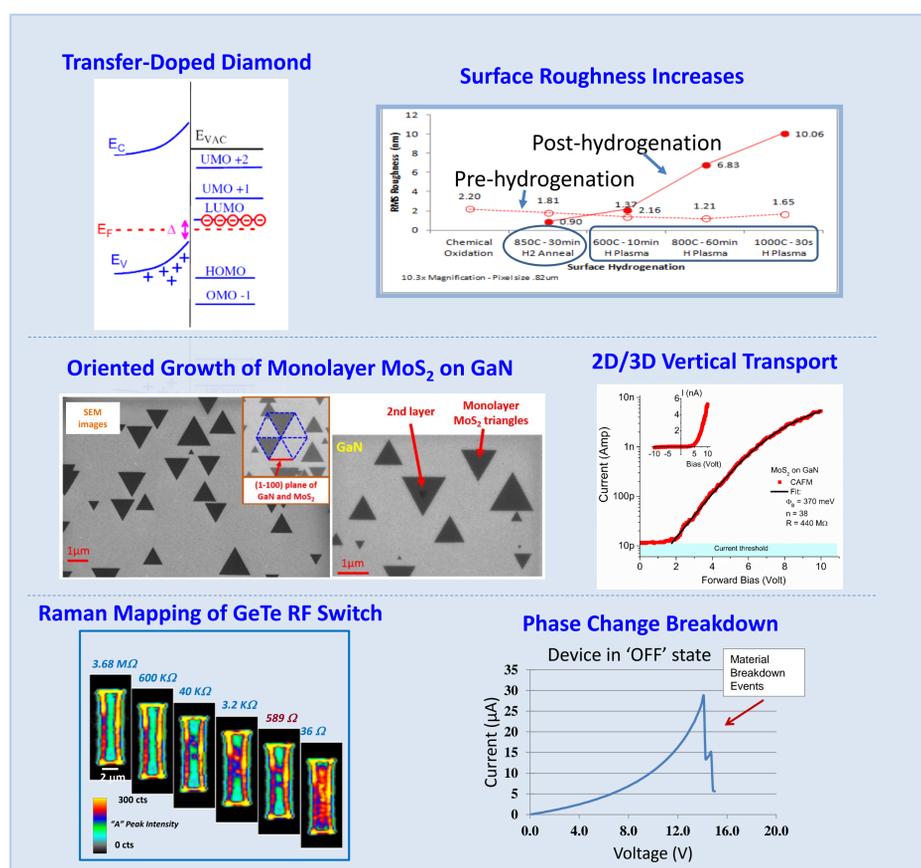
2D Materials  
CVD Growth System

## Challenges

- Growing large-area single-crystal 2D materials; transport across 2D/3D interfaces
- Limited RF power handling in phase change materials
- Obtaining smooth, low-defect diamond surfaces

## Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- CVD growth of large-area electronic grade diamond
- Plasma hydrogenation of diamond surface
- Solid state acceptor deposition on diamond
- Two-photon photo-emission spectroscopy to map out band structure of 2D/3D heterostructures
- LEEM measurements to identify orientation between MoS<sub>2</sub> and GaN
- Multiscale modeling to understand phase change evolution of GeTe



Surface Roughness - Hydrogen Plasma