Opportunity Title: Diamond RF Transistor Technology
Opportunity Reference Code: ARL-C-SEDD-300035

Organization DEVCOM Army Research Laboratory

Reference Code ARL-C-SEDD-300035

Description **About the Research**

The CCDC Army Research Laboratory (ARL) seeks a highly motivated, well informed, cross-disciplinary and skilled research associate with experience in theoretical/computational modeling and characterization of diamond surfaces (or similar systems) for the design and development of surface-doped diamond transistor. This research associate will study structural, and electronics properties of diamond/acceptor layer heterostructure with quantum mechanical first principle method. The diamond surfaces are insensitive to conventional doping techniques and require surface-doped doping technique to activate carriers for device design. An in-depth understanding of the charge transfer across the diamond surface/acceptor layer heterointerface is required in order to realize the full potential of diamond surfaces in advanced RF technology.

ARL is accelerating a strategic initiative to move the physics of topological materials to the engineering of emerging electronic devices that may solve future battlefield challenges with RF technology, and equivalently may advance related civilian technology. Recent theoretical predictions for the device concepts based on diamond surfaces far exceed today's state of the art RF technology. Many of these opportunities can take advantage of high thermal conductivity and carrier mobilities of bulk diamond. This fellowship is a unique opportunity to take full advantage of ARL's strategic intra-extramural reach with a seamless collaboration among ARL laboratories, extended campuses and leading academic scientists.

Keywords: Computational Chemistry, Condensed matter physics, interfacial phenomena, structural propeties, electronic structure

ARL Advisor: Tony Ivanov; Mahesh Neupane; Peter Khooshabehadeh

ARL Advisor
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About SEDD

The Sensors and Electron Devices Directorate (SEDD) is the Army's principal center for research and development in the exploration and exploitation of the electromagnetic spectrum, which includes radio frequency, microwave, millimeter-wave, infrared (IR), visible, and audio regions. SEDD is responsible for advances in laser sources, RF sources, IR sensors, signature detection and decoding, target imaging and its interpretation, fusion of data derived from several sensors, and electromagnetic protection.

In addition, SEDD is responsible for improving the technology base for electron devices and materials related to sensors and power devices. Research is conducted in related aspects of physics, electrical engineering, computer science, solid-state physics, chemical engineering, material

sciences, and electrochemistry.

About ARL-RAP

The Army Research Laboratory Research Associateship Program (ARL-RAP) is designed to significantly increase the involvement of creative and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Army. Scientists and Engineers at the CCDC Army Research Laboratory (ARL) help shape and execute the Army's program for meeting the challenge of developing technologies that will support Army forces in meeting future operational needs by pursuing scientific research and technological developments in diverse fields such as: applied mathematics, atmospheric characterization, simulation and human modeling, digital/optical signal processing, nanotechnology, material science and technology, multifunctional technology, combustion processes, propulsion and flight physics, communication and networking, and computational and information sciences.

A complete application includes:

- **Curriculum Vitae or Resume**
- **Three References Forms**
  - An email with a link to the reference form will be available in Zintellect to the applicant upon completion of the on-line application. Please send this email to persons you have selected to complete a reference.
  - References should be from persons familiar with your educational and professional qualifications (include your thesis or dissertation advisor, if applicable)
- **Transcripts**
  - Transcript verifying receipt of degree must be submitted with the application. Student/unofficial copy is acceptable

If selected by an advisor the participant will also be required to write a **research proposal** to submit to the ARL-RAP review panel for :

- Research topic should relate to a specific opportunity at ARL (see Research Areas)
- The objective of the research topic should be clear and have a defined outcome
- Explain the direction you plan to pursue
- Include expected period for completing the study
- Include a brief background such as preparation and motivation for the research
- References of published efforts may be used to improve the proposal

A link to upload the proposal will be provided to the applicant once the advisor has made their selection.

Questions about this opportunity? Please email ARLFellowship@orau.org

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Eligibility Requirements

- **Degree:** Bachelor's Degree, Master's Degree, or Doctoral Degree received within the last 60 months or currently pursuing.
- **Academic Level(s):** Any academic level.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Engineering** (4 👁)
  - **Physics** (16 👁)
- **Age:** Must be 18 years of age