

Opportunity Title: Nanofunctional Materials and Devices (2)

Opportunity Reference Code: ARL-R-ARD-400017-F1

Organization DEVCOM Army Research Laboratory

Reference Code ARL-R-ARD-400017-F1

Description About the Research

The project is focused on growth, synthesis, metrology and functional (optical, electrical, magnetic, electromagnetic) property and device characterizations of semiconductor and metal quantum dots, nanotubes, and two-dimensional (2D) nanomaterials and their heterostructures. Multiple approaches, including wet chemistry, bio-templated, chemical vapor deposition (CVD), electron-beam (E-beam) and sputtering deposition are used to synthesize/grow and assemble materials. Metrology approaches involve scanning electron microscopy (SEM), high resolution - transmission electron microscopy (HR-TEM), selected area electron diffraction (SAED), X-Ray energy dispersive spectroscopy (EDS), Ultra high vacuum (UHV) atomic force microscopy (AFM), scanning tunnel microscopy (STM) X-ray crystallography and a suite of spectroscopic techniques including Raman, UV-Visible, and photoluminescence (PL) spectroscopies. Specific properties of interest are electrical and thermal transport, electron tunneling, spin-aligned electron transport, Hall effect, magneto-optical effects, linear and non-linear optical (NLO) effects, strong light-matter coupling assisted plasmonic and polaritonic effects. Device assembly and fabrication involve E-beam and focused-ion beam (FIB) lithography and deposition, wet and dry etching techniques, and nanostructuring using a combination of laser-assisted and FIB milling. Device characterization are performed with four-probe measurements, STM, vibrating sample magnetometer (VSM), a suite of electrical and magnetic probes at room temperature as well as in cryogenic conditions with Physical Properties Measurement Systems (PPMS), Kerr-effect set up, among others.

ARL Advisor: Shashi Karna

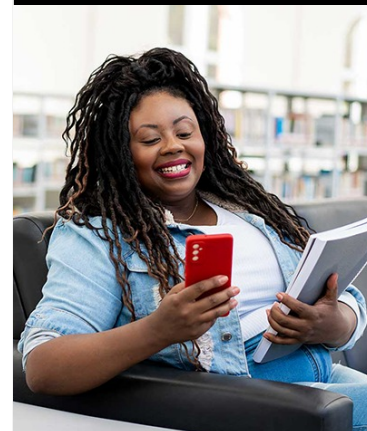
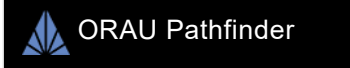
ARL Advisor Email: shashi.p.karna.civ@army.mil

About ARD

ARL's Army Research Directorate focuses on exploiting concept development, discovery, technology development, and transition of the most promising disruptive science and technology to deliver to the Army fundamentally advantageous science-based capabilities through laboratory's 11 research competencies. This intramural research directorate also manages the laboratory's essential research programs, which are flagship research efforts focused on delivering defined outcomes.

About ARL-RAP

The [Army Research Laboratory Research Associateship Program](#) (ARL-



Whether you are just starting your career or already at a senior level, ORAU offers internships, fellowships, research opportunities, and contract positions that can provide you with invaluable experience. Download the ORAU Pathfinder mobile app and find the right opportunity to propel you along your career path!

Visit ORAU Pathfinder [↗](#)



Opportunity Title: Nanofunctional Materials and Devices (2)

Opportunity Reference Code: ARL-R-ARD-400017-F1

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.

Point of Contact [ARL Fellowship](#)

Eligibility • **Citizenship:** U.S. Citizen Only

Opportunity Title: Nanofunctional Materials and Devices (2)

Opportunity Reference Code: ARL-R-ARD-400017-F1

- Requirements**
- **Degree:** Associate's Degree, Bachelor's Degree, Master's Degree, or Doctoral Degree.
 - **Academic Level(s):** Any academic level.
 - **Discipline(s):**
 - **Business** ([11](#) )
 - **Chemistry and Materials Sciences** ([12](#) )
 - **Communications and Graphics Design** ([6](#) )
 - **Computer, Information, and Data Sciences** ([17](#) )
 - **Earth and Geosciences** ([21](#) )
 - **Engineering** ([27](#) )
 - **Environmental and Marine Sciences** ([14](#) )
 - **Life Health and Medical Sciences** ([48](#) )
 - **Mathematics and Statistics** ([11](#) )
 - **Other Non-Science & Engineering** ([13](#) )
 - **Physics** ([16](#) )
 - **Science & Engineering-related** ([2](#) )
 - **Social and Behavioral Sciences** ([29](#) )