Opportunity Title: Integrated Photonics Sensors
Opportunity Reference Code: ARL-R-PEQS-400049-F1

Organization DEVCOM Army Research Laboratory

Reference Code ARL-R-PEQS-400049-F1

Description **About the Army Research Laboratory**

The U.S. Army Combat Capabilities Development Command Army Research Laboratory, known as DEVCOM ARL, is the Army's research laboratory. Nested strategically within DEVCOM and the Army Futures Command, ARL's mission is to Operationalize Science. A hallmark of ARL's mission is collaborative partnerships to broaden Army access to expert talent and accelerate transitions of science-enabled capabilities. We focus 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 research competencies.

DEVCOM ARL identifies and executes disruptive research leading to scientific discovery and emerging technologies for Army continuous transformation. This research is based on eleven foundational research competencies: Biological and Biotechnology Sciences; Electromagnetic Spectrum Sciences; Energy Sciences, Humans in Complex Systems; Mechanical Sciences; Military Information Sciences; Network, Cyber, and Computational Sciences; Photonics, Electronics, and Quantum Sciences; Sciences of Extreme Materials; Terminal Effects; and Weapons Sciences.

Photonic Integrated Circuit (PIC) sensors for small molecules and proteins

The Integrated Photonics Branch in the Photonic, Electronic and Quantum Sciences (PEQS) Division seeks a postdoctoral researcher working in the areas of chemical/biological sensing and wearable electronics. Our team is focused on the development of wearable sensors for the continuous sensing of chemicals, small molecules and proteins. The aim of this project is to develop a prototype and/or deployable system for health diagnostics and continuous monitoring. Current areas of interest for the project are recognition element integration, microfluidics, circuit design and computer interfacing. This project targets sensing for sports medicine, performance, safety and health diagnostics.

An ideal candidate will be self-motivated, creative and have experience in sensor development, photonic/electronic circuit design and wearables. Experience in experimental design and analytical characterization is necessary. Working knowledge of data analysis and analytical methods including spectroscopy and microscopy is preferred. Primary responsibility will be assisting in the development of wearable PIC sensors with integrated electronics as well as characterizing and optimizing films/components for sensing requirements. Additional responsibilities will include working with surface modifications and polymer deposition. A

successful candidate will work closely with ARL researchers and other DoD institutions as well as the opportunity to expand our research.

This is an excellent opportunity to develop skills in silicon photonics and prototyping. This position is open until filled. This position is open to applicants with a PhD. To contact Drs. Morales and Bickford to discuss the project and your interest in joining us, please send your CV and cover letter directly to: Jennifer.M.Morales40.civ@army.mil and include the tag [PIC Sensor Postdoc] in the subject line.

Advisor Name: Jennifer Morales

Advisor Email: jennifer.m.morales40.civ@army.mil

Advisor Name: Justin Bickford

Advisor Email: justin.r.bickford.civ@army.mil

About ARD

ARL's Army Research Directorate (ARD) 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-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.

About PHOTONICS, ELECTRONICS, & QUANTUM SCIENCES (PE&QS):

Materials (and related manufacturing methods) and devices intended for achieving photonic, electronic, and quantum-based effects.

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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 **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.

Qualifications **Qualifications**

- Doctoral degree in bioengineering, electrical engineering, mechanical engineering, chemical engineering, chemistry, biology or related field.
- Ability to work independently and collaborate with a multidisciplinary team
- At least one first-author publication in a peer-reviewed journal
- Strong written and oral communication skills

Preferences:

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- Sensor development: Circuit design, bioelectronic integration, recognition element design
- Experience in label-free sensing, health monitoring and non-invasive testing
- Experience in electrical measurements and complex experimental setups
- Familiarity with micro/nanofabrication or clean room techniques
- Experience in or willing to learn COMSOL, Matlab or Python is preferred

Mentorship and Training Opportunities:

- Work with PIs to create an Individual Development Plan (IDP)
- Attend and present at conferences and workshops
- Opportunity to publish and work with other labs in the DoD and academia
- Mentor undergraduate summer students and SMART program fellows

Keywords: Wearable, Biosensor, Sensing, Photonics, Photonic Integrated circuits, Silicon Photonics, Electrical Engineering, Bioengineering

Point of Contact ARL

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Academic Level(s):** Doctoral Degree (Postdoctoral Fellow).
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Communications and Graphics Design** (2 👁)
  - **Computer, Information, and Data Sciences** (17 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (51 👁)
  - **Mathematics and Statistics** (11 👁)
  - **Physics** (16 👁)
  - **Science & Engineering-related** (2 👁)
  - **Social and Behavioral Sciences** (29 👁)