

Opportunity Title: Mesoporous and Nanoporous Film Characterization

Opportunity Reference Code: ICPD-2020-04

Organization Office of the Director of National Intelligence (ODNI)

Reference Code ICPD-2020-04

How to Apply **Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at:
<https://orise.ora.gov/icpostdoc/index.html>.

If you have questions, send an email to ICPostdoc@ora.gov. Please include the reference code for this opportunity in your email.

Application Deadline 2/28/2020 6:00:00 PM Eastern Time Zone

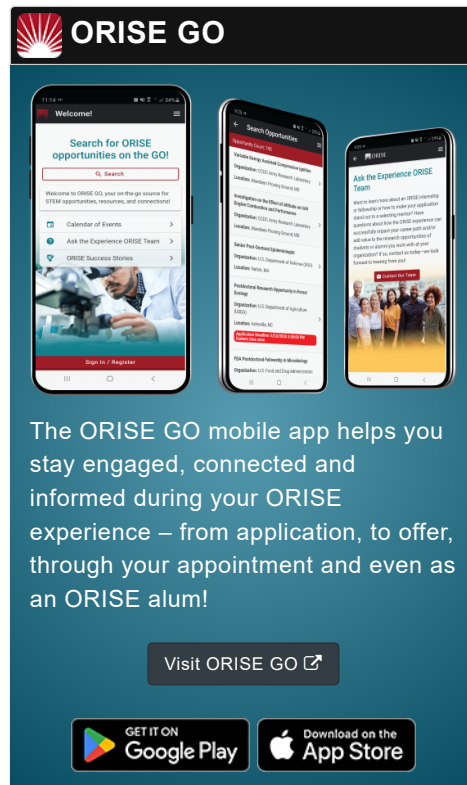
Description **Research Topic Description, including Problem Statement:**

Thin ordered layers (mesoporous and nanoporous films) are essential for nanoparticle research. Meso- and nano-porous ordered films possess several unique qualities, such as membrane flexibility, high surface area, and ordered porosity, that make them critical for further nano research in numerous areas including spectroscopy, surface catalytics, super capacitating membranes, optics, and biosciences. Nano research across several different fields have shown significant sensitivity to the precise ordering, porosity, and topology of the pores on a film. Physical and chemical methods of porous layer syntheses are well developed, but a reliable quantitative characterization of their porosity, especially in contact with liquids, is difficult. These challenges present a significant hurdle to the nanotechnology field, hindering research efficiency.

Example Approaches:

Brunauer-Emmett-Teller theory is the most common means to quantify microporosity, though this method is limited to gas absorption upon a thicker solid substrate, rather than meso and nanoporous films. X-ray based approaches include small angle x-ray scattering (SAXS) and grazing-incidence small-angle scattering (GISAXS). Israeli researchers have proposed a quartz crystal microbalance with dissipation monitoring method consistent with other approaches and that could be performed with liquids. Researchers believe this approach addresses quantitative characterization shortcomings of other methods on meso and nanoporous films, especially with respect to complex layered substrate material used in energy storage devices. This would mark a significant improvement in the ability to exercise quality control over films that could increase experimentation reliability and lead to new discoveries.

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Nanoparticle research is a fast developing field offering significantly improved results across a broad number of disciplines, many of which would enable Intelligence Community activities. Progress in the rapid and consistent creation of high quality meso and nanoporous films would significantly advance research in battery development/power management and collection. Specifically, this is relevant for potential advances in creating miniaturized sensors with greater sensitivity and endurance in remote locations.

Key Words: Nanoparticle, Nanotechnology, Nano Research, Nanoporous Film, Mesoporous Film, Porosity

Qualifications

Postdoc Eligibility

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** (12 )
 - **Communications and Graphics Design** (2 )
 - **Computer, Information, and Data Sciences** (16 )
 - **Earth and Geosciences** (21 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (14 )
 - **Life Health and Medical Sciences** (45 )
 - **Mathematics and Statistics** (10 )
 - **Other Non-Science & Engineering** (2 )
 - **Physics** (16 )
 - **Science & Engineering-related** (1 )
 - **Social and Behavioral Sciences** (27 )