OAK RIDGE National Laboratory | CENTER FOR NANOPHASE MATERIALS SCIENCES

CNMS USE ONLY	
Proposal Number:	
Date Received:	

CENTER FOR NANOPHASE MATERIALS SCIENCES RESEARCH PROPOSAL

Submit complete proposal package to: CNMS User Coordinator, Oak Ridge National Laboratory, Email: cnmsuser@ornl.gov
Your proposal package must include:
(1) Completed proposal form;
(2) Two-page CV (NSF-style or similar) for the Principal Investigator only; and
(3) Supplementary appendix for use of microanalysis facilities provided by SHaRE (if applicable).

Title of Proposal:	Date Submitted:

Principal Investigator— Responsible for progress of the project and primary point of contact for all correspondence from CNMS.

Name of PI:	☐ Check if PI will participate on-site at ORNL
Institution/Employer:	Phone:
Dept:	Fax:
Street Address or P.O. Box:	Email:
City: State/Prov.: Country: Postal Code: Citizenship:	

Collaborators - List everyone else who will participate in this project, including students, postdocs, etc.
Only the PI and participants named below will be eligible for an ORNL badge authorized through this project.

Name of Collaborator **(attach additional sheets if necessary)**	**Institution/Employer and Address**	**Citizen-ship**	**Email**	**Please Check If Participating On-Site**

CNMS Facilities Requested

Indicate below all facilities *and the number of days for each* at CNMS that will be required for this project. NOTE: CNMS reserves the right to refuse access to any facility that is not marked on this page. The Research Description section must describe how each of the selected facilities will be used, including estimates of the quantities of materials/samples to be synthesized or characterized and the estimated time required in each facility. Users are encouraged to contact CNMS staff for assistance in estimating the appropriate times and quantities.
See http://www.cnms.ornl.gov/capabilities/cap.shtm for detailed descriptions of these facilities and list of contacts.

NANOMATERIALS SYNTHESIS AND FUNCTIONAL ASSEMBLY

MACROMOLECULAR NANOMATERIALS

- ☐ Polymer synthesis (Anionic, radical, cationic, and step growth polymerizations; composite materials)
- ☐ Synthesis of novel monomers and precursors
- ☐ Deuterated monomers, polymers
- ☐ 500 MHz Solution NMR Spectroscopy
- ☐ Macromolecular characterization- molecular weight, spectroscopy, scattering, thermal analysis (details on web site)
- ☐ Thin Film Characterization (ellipsometry, FTIR-ATR, FTIR microscopy, contact angle goniometer)

FUNCTIONAL HYBRID NANOMATERIALS

- ☐ Synthesis of Nanomaterials by CVD, PLD with in situ diagnostics—2D TMCs, graphene; 1D SWNTs, NT Arrays, NWs; NPs, SWNHs
- ☐ Oxide Thin Film PLD with high-pressure RHEED—films, complex heterostructures, PLD with RF sputtering and laser heating
- ☐ Laser Material Interactions and Processing with in situ diagnostics—heating, patterning, thinning, structuring, transfer, with XY scanning
- ☐ Wet/Dry Assembly of Organic/Inorganic/Hybrid Films and Devices—dual glovebox evaporator, Sonospray, 2D stamping, perovskite PV
- ☐ Optical Characterization and Laser Spectroscopy—ultrafast dynamics, microRaman, PL lifetime, UV-VIS-NIR, fluorometry, PLE
- ☐ Electrical/Optoelectronic Characterization in Controlled Environments—Semiconductor, R-T, AC impedance, PV and OLED efficiency
- ☐ Catalysis and Operando Spectroscopy: gas phase, electro- and photo-chemistry

NANOMATERIALS THEORY INSTITUTE

- ___ K cpu-hours NTI Computational Cluster, capacity computing
- ___ K cpu-hours Facilitation of access to NERSC, high-performance
- ___ K cpu-hours Facilitation of access to NCCS, leadership class
- ___ days NTI staff support, experimental project
- ___ days NTI staff support, theoretical project

NEUTRON SCATTERING & X-RAY CAPABILITIES

- ☐ X-ray diffraction and small-angle scattering
- ☐ Neutron Scattering—attach Neutron Scattering appx.

SCANNING PROBE MICROSCOPY

- ☐ Advanced SPM: air, liquid, glove box (cAFM, PFM, ESM, MFM)
- ☐ AFM: topography
- ☐ Laser MBE with in situ RHEED, AFM/STM, electron spectroscopies
- ☐ Magnetic Property Measurement System
- ☐ Ultrahigh Vacuum 4-probe STM
- ☐ Ultrahigh Vacuum AFM
- ☐ Ultrahigh Vacuum STM/STS

NANOFABRICATION RESEARCH LABORATORY

- ☐ Process Design for Cleanroom Processes
- ☐ E-beam Lithography
- ☐ Dual-beam SEM/FIB
- ☐ 3D Direct-Write Fabrication
- ☐ FirstNano Rapid Thermal Processing Tool
- ☐ Plasma Atomic Layer Deposition
- ☐ Helium-Ion Milling (Zeiss Orion NanoFab)
- ☐ Advanced SEM (Zeiss Merlin)
- ☐ General Cleanroom Use (see website for details)

BIO-INSPIRED NANOMATERIALS

- ☐ Multimodality live-cell imaging
- ☐ DC-PECVD synthesis of VACNFs or CNSs

ELECTRON MICROSCOPY & ATOM PROBE TOMOGRAPHY

- ☐ Soft Matter TEM (Zeiss Libra)
- ☐ High-resolution TEM/STEM with EELS & EDS (Hitachi HF3300)
- ☐ Low-voltage (60-100kV) aberration-corrected STEM/EELS (Nion U100)
- ☐ 300kV aberration-corrected STEM/EELS(FEI Titan S)
- ☐ TEM Specimen Preparation (FIB, microtome, ion mill)
- ☐ Atom Probe Tomography (LEAP 4000X HR)
- ☐ FIB to prepare APT needles (FEI Nova 200)
- ☐ Helium-Ion Microscopy (Zeiss Orion NanoFab)

OTHER FACILITIES—If you have identified other facilities not listed above that you want to use, *you must first contact a CNMS Staff Member to discuss availability* then provide their name and facility description below. CNMS cannot pay any costs associated with use of other ORNL facilities.

CNMS Staff Member(s): Facility Description:

Scheduling Considerations

Estimate the total number of days that will be needed at the CNMS: (Required)
Propose a specific date to begin work at CNMS: (Optional)

Samples and Identification of Hazards

Research samples used in this project will be:

- ☐ Synthesized at CNMS
- ☐ Supplied by user with additional processing at CNMS
- ☐ Wholly supplied by user, only characterized at CNMS
- ☐ I have special sample handling requirements (e.g., air- or light-sensitive materials, etc.) (specify):

Provide a brief description of ALL materials (samples, supplies, and equipment) that you plan to bring into the CNMS. Materials and equipment that are not specifically listed here will not be allowed into CNMS. Include common name and chemical formula if applicable. Check any boxes below that apply to these materials.

☐ No major safety issues	☐ Corrosive Material	☐ Explosive Material	☐ Electrical/Electronic Equipment
☐ Flammable Material	☐ Radioactive Material	☐ Lasers	☐ Other: (*specify*)
☐ Carcinogenic	☐ Biohazardous	☐ Cryogenic hazard	
☐ Human subjects or human bodily materials	☐ Toxic Material	☐ High Pressure	

User Access Mode: ☐General User ☐Partner User (for development of specialized facilities or methods)
(For definitions of User Access Modes see http://cnms.ornl.gov/user/policies.shtm#modes)

State in your own words the reasons that led you to propose performing this research at the CNMS as opposed to some other facility, i.e., why are CNMS facilities or expertise needed? (limit to 2 lines).

Have you contacted a CNMS staff member to discuss the feasibility of your project? ☐Yes ☐No
Contact Name(s):

Suggestions for capabilities that CNMS may consider acquiring that would benefit your research:

Please Categorize Your Proposal (Required for DOE reporting purposes)

Subject of this Project (check all that apply)

- ☐ Materials Sciences (including condensed matter physics, materials chemistry)
- ☐ Physics (excluding condensed matter physics)
- ☐ Chemistry (excluding materials chemistry)
- ☐ Polymers
- ☐ Medical Applications
- ☐ Biological, Life Sciences (excluding medical applications)
- ☐ Earth Sciences
- ☐ Environmental Sciences
- ☐ Optics
- ☐ Engineering
- ☐ Instrumentation or technique development related to user facilities
- ☐ Purchase of specialty services or materials
- ☐ Other: specify
- ☐ DOE, Basic Energy Sciences
- ☐ DOE, Biological & Environmental Res.
- ☐ DOE, Other: specify

Sources of Support (check all that apply)

- ☐ DOD: specify
- ☐ NSF
- ☐ NIH
- ☐ NASA
- ☐ USDA
- ☐ Other US Govt: specify
- ☐ Industry
- ☐ Foreign: specify
- ☐ Other: University of Tennessee at Knoxville

Status of Funding for Proposed Research

Occasionally, an approved CNMS user may not be able to utilize their full time allocation because they do not have sufficient funding in place. The information requested below will be used only to help us anticipate how much potential unclaimed time may become available to support additional user projects. It will not affect the outcome of the review process. Please check the box that applies.
☐Proposal team members have research grant(s) already in place that is/are sufficient to support their participation in this project.
☐We have submitted proposal(s) to the following agencies to request funding that will be needed to support our participation:
Funding agency_____; Expected decision date: _____

SUGGESTED REVIEWERS (Optional) - You may suggest up to 5 of the most suitable reviewers from the current CNMS Proposal Review Committee listed at http://www.cnms.ornl.gov/about_cnms/PRC.shtm. In addition, you may also list up to 3 individuals who are not on the CNMS Review Committee. Do not include anyone affiliated with ORNL, CNMS, or your home institution, recent collaborators, or anyone else who may have "Potentially Disqualifying Conflicts of Interest" as defined by the *National Science Foundation*, (see http://www.nsf.gov/pubs/gpg/nsf04_23/appb.jsp).

From the CNMS Proposal Review Committee:
1. 2. 3.
4. 5._____

Optional- Additional reviewers NOT from the CNMS Review Committee (provide institutional affiliation):
6. Name:_____ Institution _____
7. Name:_____ Institution _____
8. Name: _____ Institution _____

Optional- Please EXCLUDE the following members of the CNMS Proposal Review Committee due to a potential conflict of interest:
_____

PRINCIPAL INVESTIGATOR'S AGREEMENT: *Signature is not required if the proposal is transmitted by email from the PI.*
By signing or by electronic submission, I certify that the information provided herein is correct to the best of my knowledge and that I intend to publish the results of this research. I also agree to (1) acknowledge the CNMS in all publications resulting from the use of the facility; (2) send a timely draft of all manuscripts to all ORNL co-authors for review prior to submission; and (3) send a copy of resulting publications to the CNMS User Coordinator.

Signature of PI: **Printed Name:** **Date:**

DESCRIPTION OF PROPOSED RESEARCH

The description must be limited to a maximum of 2 pages, including text and figures. PIs are encouraged to consult the CNMS Proposal Evaluation Guidelines used by reviewers at
http://www.cnms.ornl.gov/about_cnms/eval_guidelines.shtm.
Note: If you plan to use figures, it is best to copy/paste pre-formatted figures with text into this form.

ADDRESS EACH OF THE FOLLOWING QUESTIONS IN A SEPARATE SECTION.
A maximum of 2 pages can be used to respond to the 6 numbered questions below; Proposers may determine the amount of space used for each question.

1)**What is/are the main scientific question(s) that you plan to address?**

TBW.

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2) **Outline the overall technical approach that you plan to use to address the above questions. This section should provide the context for research tasks described below in sections (3), home institution activities, and (4), CNMS research.**

TBW.

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3) **What research tasks will be carried out at the users' home institution or elsewhere outside of the CNMS? Include any preliminary syntheses, measurements, or tests that have been/will be performed in preparation for the proposed research at the CNMS.**

TBW.

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4) **Describe very clearly and specifically the research tasks to be carried out at the CNMS and the expected outcomes from the CNMS tasks. Include any technical milestones that must be met for the research to be successful.**

TBW.

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5) **Provide an overall timeline for the CNMS tasks and describe how each facility/instrument that is checked on p. 2 will be used, including estimates of the number/quantities of samples, instrument time, CPU time, etc.**

TBW.

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6) **What is your team's specific experience and expertise relevant to this research project?**

TBW.

LITERATURE CITED ABOVE—if any (not included in the 2 page limit)
References

1. [Test, 2099] A. Test *et al.*, *Some Physics Journal* **999**, 1-99 (2099).

New PUBLICATION RECORD: Have you had any previous CNMS project(s)? YES☐ NO☐(response required)
If yes, list publications resulting from your past project(s)—-maximum of 10:
(enter text here)

The section below is for PARTNER USER proposals only (half page or less - not included in the 2 page limit)

PARTNER USER proposals only: What unique, new capabilities will be developed at the CNMS as a result of this approach? How will these contribute to future research by other CNMS users?
