CNST Center for Nanoscale Science & Technology

CNST NanoFab Project Application Part I: Project Information

PLEASE READ ATTACHED INSTRUCTIONS, CHECKING ALL BOXES THAT APPLY.

As a national, shared-use facility supported by the Department of Commerce, the NanoFab must maintain comprehensive records of the researchers making use of and benefiting from the facility, along with the associated accomplishments. In submitting this application, the user agrees to the following:

- To provide a comprehensive list of collaborators associated with the project, updated annually.
- To acknowledge the CNST in all publications, presentations, and other public documents reporting results associated with this project. Publications should include "Research performed in part at the NIST Center for Nanoscale Science and Technology."
- To provide annually a copy of or link to all such publications.
- To provide annually a list of all outputs and accomplishments associated with this project, including publications, presentations, patent applications, media citations, honors, and awards.

A. Project Information

1 Project number (or enter "NEW"):

2 New or updated project title:

3 Research area: Select Research Area

4 ☐ This project includes proprietary research.

5 ☐ This project has the following programmatic deadlines:

Proposed start date: End date:

B. Applicant Contact Information

Last Name: First Name:

6 Institutional Affiliation (NIST Associate should list primary institution):

7 ☐ I am a NIST Associate in DIV:

8 ☐ I am the Projects Principal Investigator. If not complete part C.

Phone: Email:

C. Principal Investigator Contact Information

Last Name: First Name:

Institutional Affiliation (NIST Associate should list primary institution):

☐ NIST Associate in DIV:

Phone: Email:

NIST National Institute of Standards and Technology U.S. Department of Commerce

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D. Project Description

9 Briefly describe the specific long-term goal of your research project.

10 Description of processes and tools required and how they will be used:

11 ☐ I will bring the following reagents into the cleanroom:

Check all tools and processes needed.

Lithography	Thermal Processing	Dry Etching	Metrology
☐ E-beam	☐ Oxidation Furnaces	☐ Flourine RIE	☐ Zeiss Supra 60 FESEM
☐ Contact	☐ CMOS Oxidations	☐ Flourine ICP/RIE	☐ Spectroscopic Ellipsometer
☐ Nanoimprint	☐ Rapid Thermal Annealing	☐ Chlorine RIE	☐ Nanospec Reflectometer
☐ Focused Ion Beam	☐ 10% H2 Anneal	☐ Chlorine ICP/RIE	☐ DEKTAK 6 Profilometer
☐ Mask Writer	☐ Phos Doping (solid source)	☐ XeF2 etch	☐ 4-Point Probe
	☐ Boron Doping (solid source)	☐ Microwave Asher	☐ Flexus Stress Measurement
Thin Films	**Other**		☐ Tabletop SEM
☐ Sputter	☐ Wafer Bonder		☐ Atomic Force Microscope
☐ E-beam evaporator	☐ Dicing Saw		
☐ Thermal evaporator	☐ Wire Bonder		
☐ LPCVD			
☐ PECVD			
☐ Parylene system			

Return

- ☐ Nanobiotechnology
- ☐ Nanochemistry
- ☐ Characterization, Nanometrology, and Nanoscale Measurements
  - ☐ Atomic force microscopy (AFM)
  - ☐ Electron microscopy (EM, TEM, SEM, STEM)
  - ☐ Electrospray Differential Mobility Analysis (ES-DMA)
  - ☐ Focused ion beam imaging (FIB)
  - ☐ Optical microscopy
  - ☐ Scanning tunneling microscopy (STM)
  - ☐ Scanning tunneling spectroscopy (STS)
- ☐ Nanoelectronics and Nanoscale Electronics
  - ☐ Nanophotonics
  - ☐ Nanoplasmonics
  - ☐ Nanowires
- ☐ Nanofabrication, Nanomanufacturing, and Nanoprocessing
  - ☐ Block copolymer lithography
  - ☐ Deposition
  - ☐ Direct-write lithography
  - ☐ Directed self-assembly
  - ☐ Electron beam lithography (EBL)
  - ☐ Etch
  - ☐ Focused ion beam milling (FIB)
  - ☐ Inspection
  - ☐ Interference lithography
  - ☐ Nanoimprint lithography
  - ☐ Optical lithography
- ☐ Nanofluidics
- ☐ Nanomagnetics
- ☐ Nanomechanics
  - ☐ Microelectromechanical systems (MEMS)
  - ☐ Nanoelectromechanical systems (NEMS)
- ☐ Nanophysics
- ☐ Nanotech/Environment, Health & Safety
- ☐ Nanostructured Materials
  - ☐ Carbon Nanotubes
  - ☐ Nanoparticles
  - ☐ Nanocomposites
- ☐ Nanotechnology for Energy Applications

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After completing this application, email it to the NanoFab Facility User Coordinator, Jeff Pasternak.

Each application will be reviewed by the *NanoFab Technical Review Committee* to access whether:

- the project can be carried out safely;
- the appropriate tools are available to carry out the project with a reasonable chance of success;
- the proposed materials and processes will not contaminate the facility or equipment;
- the tool usage needed for the project is within the Nanofab capacity and will not create bottlenecks for other projects;
- the project is specific and not a catchall for continuous, general use of the NanoFab;

If any concerns are raised by the Committee, they will be discussed with the applicant, who may then submit a modified application. Accepted projects are valid for one year.

Non-proprietary projects may be eligible for a partial fee waiver. To be eligible, projects from within NIST must further the NIST mission; projects from outside NIST must further the mission of the CNST — to support the development of nanotechnology through research on measurement and fabrication methods, standards, and technology.

How to Complete this Form

A. Project Information

1. If you are updating an existing project, enter the current CNST project number. If this is a new project enter the word "NEW".
2. Enter a short but descriptive title for the project.
3. Research Area: Choose from the list that will appear from the NIST research area database. Select as many Areas as are appropriate. When finished, click the "return" button at the top right of the page to return to the application.
4. Checked this box if the project includes proprietary research.
5. Check this box and explain if you have a known reporting or completion deadline associated with this project; e.g. an upcoming program review. The NanoFab Manager will work with you and the staff help you meet such deadlines.

B. Applicant Contact Information

6. Institutional affiliation: The primary institution you are affiliated with. If you are a NIST Associate, list your employer (i.e., where your paycheck comes from).
7. If you are already on-site at as a NIST Employee or Associate (i.e. you are in the NIST Name Lookup), check the appropriate box and list your Division number.
8. Check this box if you are the Principal Investigator of this project. If you are not — e.g., you are a postdoctoral researcher — complete part B with the Principal Investigator's information.

C. Principal Investigator Contact Information

Follow the guidance for 5–7 above.

D. Project Description

9. Project goal: Provide a concise description of the aim of the project, written for the scientific generalist. Two or three sentences should be adequate, as illustrated by the following examples.
   a. We are striving to develop the capability to fabricate low-loss, dielectric-based nanophotonic structures such as microdisk and photonic crystal cavities.
   b. Our long-term goal is to optimize the characteristics of new photoresists so that they are easy to apply, easy to develop, are sensitive to a broad range of visible wavelengths, have high spatial resolution when patterned, and have contrast characteristics that allow deconvolution of the field information from the resist profile.
   c. We aim to apply calibration procedures for step height, pitch, and roughness to surface measurement tools in the CNST Nanofab in order to perform a range of `clean calibrations,' where the artifact to be calibrated must remain in a particle free environment in order to be useful to customers.

10. Description of processes and tools required: This information is needed to access the whether the appropriate tools are available to undertake your project. At a minimum, provide a general description of your fabrication and/or measurement plans. If possible, provide a step-by-step process flow, as illustrated by the following example.

    Process for nanofabrication of dielectric (SiO_2/SiN_x) microresonators:

    I. LPCVD growth of silicon nitride on silicon or thermal oxidation of silicon (to create silicon dioxide on silicon)
    II. Electron beam lithography followed by RIE or wet chemical etching for the realization of microcavities (microdisks, photonic crystals, etc) on SiO_2/SiN_x films over Si substrates.
    III. Timed KOH etching of Si substrate for producing suspended microdisk structures.

11. If your project requires you to bring any outside reagents into the facility, please list their technical name and purpose here.