

# Center for NanoTechnology Report

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## Introduction

The Committee spent the day of February 12, 2001, meeting with the Directors, faculty, staff, and students of the Center for NanoTechnology. In addition, it met with Dean Denton and Associate Dean Mary Lidstrom, and discussed the Center with Vice Provost Kwiram. The agenda of the Committee's meetings is attached.

There was agreement at all levels that the Center has been highly successful in stimulating contacts and collaborations between faculty and students from a wide range of departments.

The faculty associated with the Center have been very successful in obtaining funding for their activities, but it is impossible to determine the extent to which the existence of the Center has enhanced those efforts. The Center itself has only succeeded in obtaining the Integrated Graduate Education and Research Training (IGERT) grant which is funded at the rate of approximately \$500,000 per year for five years.

The IGERT grant is a notable success. It is providing funding for graduate students from the variety of fields associated with the Center, and is fostering interdisciplinary programs and activities. A new degree track in which students will receive PhD's in XXX in Nanotechnology is being established. By all accounts this is very well received, and is supported by students, faculty, and the participating Departments.

The Directors and faculty of the Center have been imaginative and energetic in pursuing the goals of the Center, and they have made substantial progress in meeting them. As a result, the Committee recommends that funding of the Center be continued.

# Report

## Center for NanoTechnology

Nanotechnology has emerged as a major national focus of interdisciplinary research. The potential of this new science and technology and its impact on the global economy and quality of life in the new century has sparked activity throughout the world. The UIF supported Center for NanoTechnology has been effective in the coordination and stimulation of nanotechnology research and education efforts at the University of Washington. The Center has placed the University in a good position to educate the next generation of scientists and engineers in nanotechnology and to lead research efforts in this rapidly growing area.

One of the challenges and opportunities in nanotechnology is the highly interdisciplinary nature of the research. No single traditional discipline will lead this emerging area. The Center for NanoTechnology has been demonstrably effective in bringing together faculty and students from vastly different backgrounds and departments. The participants of the Center exhibited a clear sense of excitement for nanotechnology with many of faculty and graduate students citing the Center as being responsible for expanding their horizons and stimulating new collaborations. The Center established several effective activities and programs to foster this intellectual interaction.

## Seminar Series

The Center established a seminar series to bring to campus leading researchers in nanotechnology. This program clearly served as a focal point for interaction among University of Washington faculty and students and helped to create a sense of identity for the assembling group of nanotechnology researchers. Faculty and students alike cited this series as an inspiration to them to consider new research possibilities. The seminar series also provided a opportunity for students to meet with leading researchers from other institution.

## Graduate Fellowship Program

The UIF fellowship program was effective in seeding new research efforts. In some cases this enabled researchers to rapidly move their research programs in new directions. It also sparked a number of new collaborations and research proposals. The ability of faculty and students to obtain preliminary results in a new area was clearly of value in obtaining funding for the new research directions.

The fellowship program was also effective in developing a sense of community and intellectual exchange. The process of writing student proposals and encouraging interdepartmental connections appeared to be successful. An informal association of students, meeting weekly to discuss new concepts, was a valuable byproduct of the fellowship program. The successful fellowship program was augmented by the funding of the IGERT training grant that expanded the number and scope of nanotechnology students. The creation of a nanotechnology degree distinction is a novel and valuable feature of the Center for NanoTechnology.

## **Nanotech User Facility**

The user facility provides the members of the nanotechnology community with several experimental facilities which the individual members could not afford to purchase and maintain on their own. These include an environmental scanning electron microscope, two atomic force microscopes, and an inverted optical microscope. These are maintained and operated by Dong Qin; students and faculty alike spoke with the highest praise of her ability in helping them with learning to use the equipment, and in the design of experiments using the equipment. Additional shared equipment is located in the WTC to which the Center has contributed, and which is available to the Center.

This facility is of great value to the community, and it has been offered to members of the university community without charge. The facility is now in the process of being converted to a cost center which will be made available to a wider range of users from industry, other educational institutions, and members of the university. As this process unfolds it is very important that equipment acquisitions, maintenance, and user charges be managed in such a way as to provide a facility with up-to-date equipment that is well maintained and widely used and that is financially stable. It is the view of the Committee that this process is well begun, but that some care will be required to assure its success.

## **Pacific Northwest National Laboratory**

The Center is spearheading a new collaboration with the Pacific Northwest National Laboratory (PNNL). This new official multi-institutional affiliation will expand the access to research facilities and enlarge the sphere of intellectual interactions. In establishing this new connection the Center for NanoTechnology will work through many of the intellectual property, legal and managerial issues that must be addressed for formal connections to national laboratories. This association should facilitate new proposals for research funding with external laboratories.

## **IGERT**

The Center has been successful in obtaining an IGERT grant which provides funding for students engaged in cross-departmental research projects, and which is already helping the participating Departments in their recruitment of graduate students.

The program is in the process of establishing a new degree certification in which the student earns a PhD in, say, Chemistry in Nanotechnology. In order to earn this degree the student must satisfy the home department requirements, and, in addition, the program must be certified by the Center to satisfy their requirements. These requirements include joint supervision by two members of the Center for Nanotechnology from different Departments, participating in laboratories or rotations from at least one other department, and a research program approved by a committee of the Center.

All of those who spoke with the Committee expressed approval of the program. The Deans viewed it as a model for future interdisciplinary educational programs. Although it is too early to form a definitive judgment, the Committee views this as an excellent approach which appropriately accommodates the interests of the Departments, the faculty, the students, and the Center.

## Recommendations

In the original UIF proposal the goals of the Center were set forth as:

*The objectives of the Center for NanoTechnology are:*

- I. *To establish leadership in an intellectually exciting field that is about to have major impact on our society.*
- II. *To introduce nanoscience and nanotechnology as a unifying educational theme.*
- III. *To educate a new generation of undergraduate and graduate students with truly interdisciplinary skills capable of driving future nanotechnological advances in industry and academia.*
- IV. *To build a nationally recognized NanoTech-User-Facility that will serve academia and industry. To develop cutting-edge technology through formal collaborations among Center members and private industry. end{enumerate} end{quotation}*

The Directors and faculty of the Center have been imaginative and energetic in pursuing these goals, and they have made substantial progress in meeting them. As a result, the Committee recommends that funding of the Center be continued.