

**Engineering and Technology Industry Council
Campus Investment Proposal
Biennium from July 1, 2007 to June 30, 2009**

Campus: University of Oregon

Contact Name: David C. Johnson

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Summary of Proposal:

The Materials Science Institute at the University of Oregon requests \$2,400,000 in strategic funding to expand nationally recognized graduate internship programs, K-12 outreach programs, undergraduate materials program and to renovate laboratories. The requested funding will be leveraged by federal grant funds exceeding \$7,000,000 in addition to private matching funds.

Vision Statement

The Materials Science Institute at the University of Oregon is a strategic asset for Oregon's economy and Oregon residents by providing:

- nationally unique and rapidly growing graduate internship degree programs tailored to meet the needs of Oregon industry clusters
- K-12 educational outreach programs designed to yield continual returns from strategic infrastructure and teacher training investments
- nationally and internationally respected research faculty and programs that attract both research funds and human talent to Oregon from throughout the world
- world class instrumentation and staff running Oregon's high tech extension service – CAMCOR - that provides Oregon businesses a competitive advantage in the global economy by producing key information in a timely manner.

Aspirational Peers

University of California, Santa Barbara - Interdisciplinary success

University of Wisconsin - Integration of research/education

University of Minnesota - Industry partnerships

The materials programs at these three Universities are national leaders and excel in the areas indicated above. We have much to learn and to improve on to achieve the levels of achievements of these programs. We have made amazing progress over the last ten years in attracting outstanding faculty and graduate students, increasing competitive research funding, and building nationally unique programs that can reach the levels of these programs. The requested funding from ETIC is crucial to continuing this progress.

Long-term Goals

Our goals are by the year 2020 to have:

- developed an undergraduate materials chemistry program granting 20 BS degrees a year
- expanded our Graduate internship program to over 60 MS students per year and achieved the number one ranking in the nation in awarding chemistry masters degrees.
- doubled the number of Ph.D. degrees awarded per year compared to 1999.
- tripled the amount of externally funded research compared to 1999 to over \$500,000 per faculty member.
- increased the number of patent disclosures 6 fold compared to 1999.
- increased licensing revenue 19 fold compared to 1999,
- expanded the number of our industrial partners to over 40
- increased the usage of CAMCOR by outside industrial users to over \$1,000,000 annually

Investment Description

1. UO/OSU Optical Materials and Processing Graduate Internship Program Lab.

In the IGERT proposal that was recently recommended for funding by NSF at \$3.5 M/5years we proposed a 4th industrial internship track in optical materials, coatings and devices. This proposal is a joint project between faculty at OSU and UO who collaborated in the successful NSF IGERT grant. Faculty from both institutions will be instructors in the optics classes. Discussions with our company partners have made us realize that we will need to obtain several pieces of equipment to run the laboratory portion of these programs. The equipment would be available for research use the remaining portion of the year. The request to ETIC is for \$300,000 that will be leveraged by grant proposals to NSF. Ongoing support by our partnering companies through internships for the graduate interns is crucial to making the program self-sustaining, as with our existing graduate internship tracks.

2. UO/PSU Request for Seed Funding to Resume the OGI Materials/Processing Classes.

OGI no longer offers materials processing classes related to the semiconductor industry. PSU and UO propose to restart these classes. These classes are very important to MSI, as graduate internship students in Portland have historically taken these classes to complete their Masters degrees. We request \$50,000 over the biennium to help seed the resumption of these classes as we build the enrollment to numbers that will make them self-sustaining through ongoing tuition payments by graduate interns.

3. Match for GK-12 grant and educational outreach.

Two school districts participating in our NSF GK-12 project have chosen to adopt the inquiry based science curriculum promoted through our program and have purchased the science kits for their schools. We request \$750,000 in ETIC support for the implementation of this curriculum through teacher training with GK-12 Fellows in these school districts. This funding would support 8 GK-12 Fellows per year (the number required to reach the 16 schools we have not served in the two years) and help the High Desert ESD and the Bend/Lapine school district set up a restocking facility. This effort would train 325 teachers in 22 schools serving over 8700 students a year in the use of inquiry based science instruction as a vehicle to meet state and federal standards for

science, math and reading. It is important to note that this one time funding will continue to impact over 8700 students per year until the next curriculum adoption cycle in 7 years. In collaboration with the participating school districts, private support from Intel and Pacificorp has already been obtained and discussions are underway with both additional companies and private foundations to leverage the requested ETIC support. In addition, we hope to use the requested funds to match a new \$3M NSF GK-12 proposal that is being planned for submission in June 2006.

4. *UO/OMSI Request for Match for NSF Informal Science Education Outreach Proposal.*

The goal of this program is to enhance the skills of scientists in communicating the societal benefits of basic science and technology to the general public. We are partnering with OMSI in a pioneering project that will provide graduate students with training in informal science communication and engage them in developing new exhibits that highlight the applications and implications of materials and nanomaterials in the environment. We aim to develop this program as a national model for graduate education. We have submitted an NSF grant preproposal request for ~\$2.5M over five years and are requesting \$100,000 in seed funding to help develop the partnerships required for a potential invited full proposal to be successful. Additional private funds obtained through foundations or our company partners will be used to enhance this program.

5. *Undergraduate Materials program – undergraduate research program.*

To attract the best undergraduate students to materials science, we propose to create an undergraduate research program. The top students in general chemistry and introductory physics at the University of Oregon and Oregon State University will be invited to participate in a two week introduction to undergraduate research program to be held the two weeks prior to the start of the fall quarter. The students will receive training 8-5 in laboratory protocols and procedures. Parallel to this program, the IGERT Graduate Fellows will be receiving training in the mentoring of undergraduates involved in undergraduate research. At the end of the program, students will be paired with IGERT Fellows and conduct research with them throughout the school year. Participants will be required to present papers on their research projects at the annual Oregon Academy of Sciences meeting in February. \$180,000 in funds are requested to start the program by hiring a teaching post-doctoral Fellow to organize and run the training camp, the training of graduate student mentors, and to hold weekly meetings with the participants. This funding will be used to match a 600K NSF proposal for an undergraduate solid state chemistry research training program to be submitted in the second year of the biennium and will augment a 400K existing NSF proposal on this topic spearheaded by Professor Kessler at OSU, Professor Geselbracht at Reed College, and Professor Johnson at the University of Oregon. We view this program as a valuable feed program for the Graduate internship program and would welcome participation by other OUS institutions.

6. *CAMCOR Workshop Series.*

During the last three years, the staff of CAMCOR has held cutting-edge workshops by national experts in materials and surface characterization for academic and industrial scientists and engineers that have attracted both regional and national attention. There is an opportunity to expand these offerings and attract a broader range of participants from both

sectors as several national experts have asked to become partners in an ongoing lecture series on the west coast with all of the lectures to be held in Oregon. We request \$30,000 in seed funding to help share in the up-front risks of this expansion and anticipate that the revenue brought in by the workshops would enable them to be self sustaining.

7. *Laboratory renovations.*

To help retain the top faculty in MSI and to help recruit new faculty funds are needed to renovate laboratory space. We request \$990,000 in funding for partial renovation of three laboratory suites in Klamath Hall. Additional private funding will be raised to both complete the renovations and enable the purchase of state of the art instrumentation for these laboratories.

Results and Benefits

1. *UO/OSU Optical Materials and Processing Graduate Internship Program Lab.*

We plan on starting this track of the Graduate internship program in the summer of 2007 and expect 5-7 students in the first year, expanding to 20 students per year as the capacity grows with our company partners. This program is directly tied to the display and optical coatings and materials industry in Oregon, including a number of smaller firms and start up companies.

2. *UO/PSU Request for Seed Funding to Resume the OGI Materials/Processing Classes.*

We expect 5-10 graduate interns will be taking these classes annually to complete their Masters degrees. In addition, PSU graduate students and continuing education students from Portland industry have historically taken these classes and we anticipate this would continue. Classes such as these are necessary for the semiconductor processing graduate interns to complete their degrees in Portland while working at companies including LSI, Intel, Microchip, and TriQuint.

3. *Match for GK-12 grant and educational outreach.*

This request has both a long and short term impact. Long term, the GK-12 program increases the scientific literacy of a significant number of Oregon K-12 students, increasing the number who will choose science based careers. The impact in the K-12 schools lasts after the program completes the teacher training, as the curriculum is used until the next adoption cycle. We hope to expand this program of teacher training and kit infrastructure development throughout the state. Short term, the strategic investments requested also support graduate student stipends, expanding the number of Ph.D. graduate students in MSI research groups during the biennium by more than 20 per year. Both the short and long term impacts increase the number of technically skilled individuals available to be hired by Oregon firms.

4. *UO/OMSI Request for Match for NSF Informal Science Education Outreach Proposal.*

The goal of this program is to enhance the skills of scientists in communicating the societal benefits of basic science and technology to the general public. Educating the public about the technological opportunities and about studies to assess the risk of new technologies is important and necessary to enable these materials to be used commercially. Engaging the

public is also the key to garnering future public support for the discovery and development of new technologies needed to insure our competitiveness in a global economy. Invitrogen is one company that is very interested in assisting in this public education process.

5. *Undergraduate Materials program – undergraduate research program.*

To double the number of students pursuing careers in applied sciences and engineering we need to show the best and brightest the challenges and rewards associated with doing research. This program will recruit students with demonstrated aptitude in the physical sciences early in their undergraduate careers, providing them a year-long research experience with sufficient structure, including a summer research boot camp, to enhance the success of each student's research. This program will expand the number of technically skilled individuals available for hire by Oregon firms.

6. *CAMCOR Workshop Series.*

Expanding the cutting-edge workshops by national experts in materials and surface characterization for academic and industrial scientists and engineers hosted by CAMCOR will provide academic class credit opportunities for graduate internship students, continuing education opportunities for employees of Oregon companies, and attract technically trained individuals to Oregon. It will also create both regional and national attention as Oregon hosts a workshop series hosted by several national for the entire west coast audience.

7. *Laboratory renovations.*

The requested laboratory renovations will be used to attract two new faculty members to the Materials Science Institute and to help the University retain key existing faculty members as space is becoming a scarce resource at the University of Oregon.

Proposed Investment and Private Support Forecast (\$M)

	2007-2009 Biennium
Proposed State investment (\$M)	
<i>UO/OSU Optical Materials and Processing Graduate Internship Program Lab.</i>	\$300,000
<i>UO/PSU Request for Seed Funding to Resume the OGI Materials/Processing Classes.</i>	\$50,000
<i>Match for GK-12 grant and educational outreach</i>	\$750,000
<i>UO/OMSI Request for Match for NSF Informal Science Education Outreach Proposal.</i>	\$100,000
<i>Undergraduate Materials program – undergraduate research program.</i>	\$180,000
<i>CAMCOR Workshop Series.</i>	\$30,000
<i>Laboratory renovations</i>	\$990,000
Subtotal	\$2,400,000
Expected private support (\$M) (1)	\$6,000,000
Other – Federal funding	\$7,000,000
Total (\$M)	\$15,400,000
Personnel supported (FTE)	
Existing faculty (2)	0.0
New faculty(3)	0.0
Existing staff (2)	0.0
New staff(3)	2.0
Total	2.0
Uses of proposed investment	
New facilities	\$6,000,000
Improvements to facilities	\$990,000
Laboratory equipment	\$300,000
Other equipment	\$-
Other one-time expenses-graduate student stipends + cost of education allowance	\$870,000
Existing faculty salaries & benefits (2)	\$-
New faculty salaries & benefits (3)	\$-
Existing staff salaries & benefits (2)	\$-
New staff salaries & benefits (3)	\$240,000
Ongoing Research and Educational Activities (4)	\$7,000,000
Services & supplies	\$-
Total	\$15,400,000
Notes/instructions.	
(1) Consistent with ETIC Private Support Policy dated 1/23/02	
(2) Hired with ETIC funds through June 2007	
(3) To be hired with ETIC funds during 2007-2009 biennium	
(4) Supported by continuing and new competitive federal grants	

Metrics Forecast (for programs/departments receiving ETIC funding):

	Baseline		Projected (2)		
	AY 99 (1)	AY09	AY11	AY13	AY20
Undergraduate student credit hours (3)	0	150	300	500	1500
Graduate student credit hours (4)	190	1600	1800	2000	3000
Bachelor's degrees granted	0	0	5	8	20
Master's degrees granted	2	25	30	35	60
PhD degrees granted	9	10	12	15	18
Externally-funded research expenditures (5)	\$2,880,000	\$9,000,000	\$9,500,000	\$11,000,000	\$15,000,000
Invention disclosures per year (6)	3	7	10	14	20
License/options per year (7)	0	2	4	5	6
License income received per year(8)	4,522.91	12,000	35,000	65,000	100,000
Startup Companies (9)	0	1 every 4 years	1 every 3 years	1 every 2 years	1 every year
National ranking of <program> (10)					
Ranking of total Federal Expenditures as if all Chemistry	91	top 40	top 35	top 35	top 25
Ranking of total Federal Expenditures as if all Physics	83	top 40	top 35	top 35	top 25
Ranking of total Federal Expenditures as if all Materials Dept.	31	top 20	top 20	top 20	top 10
National ranking of <college> (10)					
Notes/instructions					

(1) Actuals from 12 months ending June 30, 1999.

(2) Forecast for the 12-month periods shows. Eg. AY09 should be forecast for 12-month period ending June 30, 2009.

(3) Undergraduate credit hours are for required credits of students pursuing a materials chemistry degree program.

(4) Graduate credit hours are for masters and Ph.D. students participating in MSI's graduate internship programs.

(5) Total external dollars spent by ETIC-related departments towards research during academic year.

(6) See Association of University Technology Managers (AUTM) survey definitions.

(7) Number of license or option agreements executed during the year. See AUTM survey definitions.

(8) License issue fees, payments under options, annual minimums, running royalties, termination payments, the amount of equity received when cashed in, and software end-user license fees equal to \$1000 or more, but not research funding, patent expense reimbursement, valuation of equity not cashed-in, or end-user license fees less than \$1000. See AUTM survey definitions.

(9) New companies that were dependent on the licensing of your program's technology for their initiation.

(10) Since the MSI is an institute, not a department, we are invisible to most national rankings. MSI's status as an institute, however, makes it much more able to respond to opportunities. To address the issue of National rankings, we have examined the basis for the ratings given by various sources (US News and World Report, Chemical and Engineering News, ...). While several are based on opinion polls, we believe the most impartial rankings are based on federal research dollars obtained. This data is collected nationally by NSF and is published yearly with breakouts based on disciplines – chemistry, physics and materials. We will determine the federal research expenditures generated by the institute (using the numbers reported to the federal government) and then compare the total dollars with those from other institutions across the country. These are hard numbers that cannot be fudged. The figures for academic year 1999 are detailed below.