

Engineering and Technology Industry Council Campus Investment Proposal Biennium from July 1, 2011 to June 30, 2013

Campus: University of Oregon

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Summary of Proposal:

This proposal requests funding to support the Green Materials Chemistry Center through;

- Expanding research and teaching infrastructure,
- Creating an undergraduate program for exceptional students in the physical sciences,
- Growing the capacity of our graduate internship program.

Vision and Goals Statement

The Materials Science Institute is a strategic asset for Oregon, providing:

- Unique degree programs tailored to meet the human resource needs of Oregon industry clusters,
- innovative K-12 educational outreach programs that yield compound returns from strategic infrastructure and teacher training investments,
- bridge programs that connect students in Oregon community colleges and regional universities to advanced degree programs,
- nationally recognized research programs, including Green Materials Chemistry, that attract both research funds and human talent to Oregon, and
- Oregon businesses a competitive economic through access to both experts and state of the art instrumentation in Oregon's high tech extension service – CAMCOR.

Investment Description

Expand research and teaching infrastructure:

RESEARCH INFRASTRUCTURE: In the 2009-2011 ETIC Investment Proposal, we forecasted the need to expand research infrastructure. MSI has grown its external research by more than 5x in the last decade. Faculty members no longer have the space to expand either the number of researchers in their laboratories or the equipment in their laboratories and we have no laboratories for new faculty members. To continue the growth of our externally funded research and to provide space for the NSF Green Materials Center, we need to expand the number of research laboratories and increase the efficiency of existing laboratories.

The construction of the second building in the University of Oregon's integrated science complex (ISC2), set to start in the summer of 2010, provides a timely opportunity to expand MSI's research infrastructure. We request funds to:

- Build out the 4th floor research laboratories and associated offices in ISC2 for the Green Materials Chemistry Center.
- Build an office suite for the Green Materials Chemistry Center as part of the Streisinger connector to Klamath
- Build three and upgrade three wet materials chemistry laboratories on the top floor of Klamath Hall.

Estimated investment: \$9,600,000.

GREEN CHEMISTRY AND GRADUATE INTERNSHIP TEACHING PROGRAM INFRASTRUCTURE: MSI has also grown several tracks of the graduate internship program using temporary, seasonally assigned space. This limits the use of equipment and facilities by researchers during the academic year. The ISC2 building contains four laboratories in the basement that will be used for teaching in the graduate internship program – one for the Optical Materials and Devices program, one for the Solar Energy program, a nanoparticle synthesis facility and one for the Green Materials Chemistry extension of the semiconductor program. All of these labs will be adjacent to the CAMCOR facility in ISC1. We request funding to outfit these laboratories with required teaching equipment, expanding the capacity of all three programs. With this facility investment and the investment in faculty positions, the goal by the end of the 2013 academic year is to have total enrollment in the graduate internship program exceed 50 students per year.

Estimated Investment: \$1,640,000.

Program for exceptional undergraduate students in the physical sciences

MSI is collaborating with Chemistry and Physics to create a targeted undergraduate program in the physical sciences that is aimed at attracting and providing a unique educational experience for exceptional students. This program, SMART – Science Majors with Accelerated Research Training will be a key component of the education program of the Green Materials Center. The program will engage top students in undergraduate research early in their undergraduate careers, provide internship opportunities with industry, and provide overseas research opportunities with leading research entities such as Max Planck and Fraunhofer institutes in Germany. A facilitating investment by ETIC to provide funds for laboratory equipment, marketing, and scholarships is crucial to jump-start this program. We are planning for a unique summer immersion laboratory based program for incoming students to prepare them for early starts in undergraduate research. The enrollment in this program would provide a valuable boost to ETIC's long standing goal of a 2x increase in undergraduate students with applied science/engineering training.

Estimated investment: \$1,400,000.

Growing the capacity of the graduate internship program and externally funded research.

MSI has an opportunity to significantly expand the number of faculty members within the institute during the 2011-13 biennium due to a rash of upcoming retirements in physics

and chemistry. This expansion depends, in part, on finding a source of funds to invest in the start-up packages of the new faculty hires. This requested ETIC investment would be a one-time investment in start-up funds, with the annual salaries of the positions funded by the University of Oregon. ETIC funds have been used to provide part of the start-up packages of several recent faculty hires, all of which have subsequently received prestigious national Young Investigator awards. This proposed investment in start up funds would enable MSI to continue the expansion of its research portfolio, expand the number of faculty participating in the Green Materials Center, contribute teaching expertise to the proposed SMART program and expand the number of tracks of the graduate internship program. MSI is seeking support for 5 start-up packages in the physical sciences.

Estimated cost: \$4,000,000.

MSI also is seeking funds to be used as matching funds for federal grants and/or foundation proposals aimed at improving K-12 education, creating bridging programs between community colleges and the university, creating innovative programs in higher education, and obtaining state of the art analytical equipment. These proposals are synergetic to ETIC goals of 2x and 5x, and will support the growth of the green materials center.

Estimated cost: \$2,050,000

The proposed investments, detailed above, are all multi purposed and strategic, as they support the 2x and 5x goals of ETIC and will be used as matching funds for the phase II Green Materials Center proposal, being submitted during the summer of 2010.

The requested funds also leverage growing collaborations with the OUS regional Universities. MSI is partnering with Eastern Oregon University both in research programs (for example, sensors optimized using RNA aptimers) and in developing a new masters track that combines a masters degree in chemistry or physics at the UO with a masters degree in teaching from Eastern. MSI has developed a strong partnership with the Oregon Institute of Technology, supporting its efforts to attract top students into its engineering programs by providing a direct route for these students into MSI's graduate internship program. We believe there are additional synergies to be gained between OIT's renewable energy program and MSI's graduate internship program through shared use of facilities and cross listing of courses. MSI continues to partner with Southern Oregon's undergraduate Materials program, providing a direct track into the graduate internship program for students that meet the requirements. Southern Oregon is requesting funds to support a summer course that trains students in state of the art analytical techniques. Memorandums of Understanding have been signed with both OIT and Southern to bridge their programs to those at the UO. CAMCOR provides faculty from all of the OUS institutions access to state of the art materials characterization facilities that are accessible via the web and through use on site in Eugene.

Private Support

Private support has been critical to MSI meeting its metrics and will be crucial in the continued growth of the institute and its drive towards increased excellence. Significant

matching funds have already been obtained by the University for ISC2 and will be used to match the proposed ETIC capital funds expanding wet materials laboratory facilities. Our graduate internship program does not exist without the support of our private partners. Their input into annual curricular improvements, their mentoring of the interns while they work in the company, and their providing internships for students are the keys to the success of the program. We believe this support will continue to grow if we keep meeting the needs of our partners.

We anticipate seeking a greater percentage of foundation support for MSI programs during the upcoming biennium, in part to make up for the decrease in state funds available to support K-12 and community college outreach programs. We believe the data generated by our GK-12 programs, documenting the improvements in performance achieved by placing graduate students in schools as role models for K-12 students, graduate students teaching teachers how to use inquiry based curricula, and schools adopting inquiry based science, make us hopeful that we will be able to obtain foundation support to continue and expand these programs.

Finally, both MSI research programs and the graduate internship laboratories have tremendously benefited by donations of equipment from our corporate partners. We hope that these targeted donations continue, as they are crucial to convince outside reviewers of the strength of our real and growing partnership with industry.

Results and Benefits

Short-term

We have proposed ETIC investments in facilities, programs, faculty start-up funds, and as matching funds towards federal grants. All of these investments are strategic, impacting several of the ETIC criteria, and will be leveraged with resources from other funding sources.

Facilities: The facilities will house the Green Materials Center (including researchers from OSU) and will be used as part of the university matching in our Phase II proposal to NSF. These facilities are critical to continuing the development of this center of excellence and are complementary to those being developed by our partners at Oregon State University. The expansion of research laboratories will enable existing research programs to expand as well as creating space for new faculty research groups, leading to more federal research dollars (the ETIC 5x goal) and more graduate students involved in MSI programs (the ETIC 2x goal)

Faculty: The requested start-up funds for new faculty members will enable MSI to expand, recruiting 5 top faculty members (probably 2 in chemistry and 3 in physics) into MSI related research areas. These faculty positions support the growth of research in the Green Materials Center (the positions will be used as match for the proposal), the growth of excellence as endorsed by ETIC, and the 2x and 5x growth goals. This is the largest opportunity to expand MSI since its creation in 1986. ETIC funds are critical to enable this expansion.

Programs: The requested instructional laboratory investments will be used to expand capacity of the graduate internship program, to equip the training laboratory within the Green Materials Center, and the equipment will be available to researchers when not in use for instruction.

The proposed SMART program is an experiment in undergraduate education much like the graduate internship program is an experiment in graduate education. We have talked with many of our company partners about the “good and bad” elements in current undergraduate programs. The proposed SMART program is an attempt to create a new, improved undergraduate education model for exceptional students.

All of the proposed program investments work towards ETIC’s 2x and 5x goals, and these investments will be used as part of the state matching contributions towards the green materials chemistry center phase 2 NSF proposal.

Matching funds: The availability of matching funds for federal proposals is required in some programs (for example, the NSF Major Research Instrumentation program), and very helpful in other programs (for example the UO-OSU NSF supported IGERT program). The requested funds provide flexibility in writing proposals, enabling faculty to focus requested funds on budget items favored by agencies while covering other costs with matching funds. Flexible matching funds have been crucial to the success of MSI programs and the requested matching funds will be used in part to support the Green Materials Center. The requested funds are critical to MSI’s outreach programs to the K-12 community, community colleges and the regional universities.

The requested matching funds will be used in proposals seeking instrumentation from the federal government and foundations. Which instruments are funded depends on the needs of researchers and the success of the consortia of faculty that write the proposals for equipment. All of the equipment obtained using the matching funds will become part of CAMCOR and hence available to all researchers throughout the state of Oregon.

Medium-term

Oregon researchers have worked together to create national leadership in Green Materials and Green Chemistry. However, the world does not stand still and there is continual need to innovate and out compete the competition. The requested funds for facilities improvements and faculty hires are critical for MSI, the Green Materials Center, and the state of Oregon to take advantage of the current economic difficulties and the budget cuts at universities across the country. The last two years have produced the strongest candidates for faculty positions that I have seen in my career. More importantly, the investments made in facilities and the success of MSI faculty in attracting outstanding students and research funding have made the UO the top choice of the candidates that we have interviewed despite offers from other top institutions. We need to continue to increase our advantage by building on our strengths.

The requested investments by ETIC are critical to our expanding our national leadership in green materials chemistry, to expanding the growth of the graduate internship program, and to creating an undergraduate program designed to keep top Oregon college students in the state. While ETIC has focused on increasing the absolute number of graduates, our focus is on growth through increasing the number of

exceptional students. This involves attracting top candidates, out competing other schools that also seek these students so that these candidates enroll, and developing innovative training programs that provide multiple career opportunities for our graduates. The success of these graduates attracts new students, outstanding new faculty, increased partnership with industry, and increased research funding. We believe that MSI has already demonstrated that this model is successful. Your critical investment at this time will continue to yield dividends over the next decades.

Future Plans & Resources

MSI will continue to develop new models and expand successful innovations through both private and federal support. ETIC funds have been used as strategic investments to provide long-term growth.

We anticipate requesting support in future biennia to address critical short-term needs and/or long-term growth opportunities. We have requested one-time investments in funds to be used for faculty start-ups, with the ongoing salary commitments coming from the University of Oregon. The salaries of these faculty are supported through tuition revenue. The growth of the number of graduate students in our Ph.D. program, post-doctoral investigators, and support staff is supported through the growth of research revenues.

Proposed Investment and Private Support Forecast (\$M)

		2011-2013 Biennium
1	Sources of funds	
2	Base budget for ETIC-related programs – all sources except ETIC allocation & private support (\$M)	\$ 20
3	Proposed allocation from ETIC budget (\$M) (3)	\$ 19
4	Expected private support (\$M) (4)	\$ 38
5	Total (\$M)	\$ 77
6	Personnel supported (FTE) (5)	
7	Existing faculty (1)	0.0
8	New faculty(2)	0.0
9	Existing staff (1)	0.0
10	New staff(2)	0.0
11	Total	0.0
12	New positions created (6)	
13	Faculty (2)	5.0
14	Staff (2)	0.0
15	Total	5.0
16	Uses of ETIC funds in line 3	
17	New facilities	\$ 5
18	Improvements to facilities (7)	\$ 4
19	Laboratory equipment (7)	\$ 2
20	Other equipment (7)	\$ -
21	Other one-time expenses	\$ 7
22	Existing faculty salaries & benefits (1)	\$ -
23	New faculty salaries & benefits (2)	\$ -
24	Existing staff salaries & benefits (1)	\$ -
25	New staff salaries & benefits (2)	\$ -
26	Services & supplies	\$ -
27	Other	\$ -
28	Total (8)	\$ 19
Instructions. (Replace with your own notes in the document you submit.)		
(1) Hired through June 2011 that will be supported by ETIC funds during 2011-13		
(2) To be hired with ETIC funds during 2011-2013 biennium.		
(3) Include any Certificates of Participation to be issued during 2009-2011		
(4) Consistent with ETIC Private Support Policy dated 1-23-02.		
(5) FTE expressed as percent of full time over 2 years of biennium. For instance, a new full-time faculty member hired on 7/1/12 would be counted as 0.5 because he/she joined half way through the biennium.		
(6) FTE on an ongoing basis. For instance, if a new half-time position is created but not expected to be filled until the last month of the biennium, it would still be counted as 0.5.		
(7) Include improvements and equipment to be purchased with ETIC funds and any Certificates of Participation to be issued during the biennium.		
(8) Totals on line 3 and line 28 should match.		

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

	Actuals (1)		Projected (2)		
	AY 99	AY09	AY13	AY15	AY20
Undergraduate student credit hours	0	0	450	900	3000
Graduate student credit hours	190	2358	3000	3500	4000
Graduation rate, 6-year (3)				90+%	90+%
Bachelor's degrees granted					15
Master's degrees granted	2	23	40	50	75
PhD degrees granted	9	6	17	19	25
Women graduating (4)	30%	32%	40%	45%	50%
Minorities graduating (5)	0%	0%	5%	10%	20%
Externally-funded research expenditures (6)	2,880,000	11,893,099	13,000,000	15,000,000	20,000,000
Invention disclosures (7)		5	5	5	5
License/options (8)		2	2	2	2
License income received (9)		63,367	50,000	50000	50000
Spin-off Companies (10)		0	0	0	0
National ranking of <program or department> (11)		7	5	3	1
National ranking of <college> (12)					
Notes/instructions. (Delete these notes and replace with your own in the document you submit.)					
(1) Actuals for 12-month period ending in June of the year shown.					
(2) Forecast for the 12-month period ending in June of the year shown.					
(3) Percentage of undergraduate students who started ETIC-Supported program as freshmen six years earlier who have completed bachelor's degree in an ETIC-supported degree.					
(4) From engineering, computer science, and other programs directly benefiting from ETIC funding, stated as percent of all those graduating.					
(5) Racial and ethnic minorities who are US citizens or permanent residents, stated percent of US citizens or permanent residents graduating.					
(6) Total external dollars spent by ETIC-related departments towards research during academic year.					
(7) See Association of University Technology Managers (AUTM) survey definitions.					
(8) Number of license or option agreements executed during the year. See AUTM survey definitions.					
(9) 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.					
(10) New companies that were dependent on the licensing of your program's technology for their initiation. See AUTM survey definitions.					
(11) Forecasts for multiple programs and departments are encouraged. Each ranking should be footnoted with the ranking body or ranking methodology.					
(12) Add additional metrics as appropriate.					