

**Florida Atlantic University**  
**Florida Center of Excellence in Biomedical and Marine Biotechnology**  
**Revised Budget Justification**

**Infrastructure:**

*Core Facility*

A Biotechnology Core Facility is being established on FAU's Boca Raton campus with previously appropriated funds. Staffing and equipping this Facility is the single most expensive item in this budget and will have an immediate and significant benefit for Center participants in both academia and industry. The Core Facility will house current equipment already present at FAU including an Affymetrix Gene Chip machine. New equipment to be purchased will include a variety of instrumentation for nucleic acid work, protein studies and cell biology totaling \$1.506 million. Two technical personnel for two years and \$80,000 per year for supplies will be used to set up and operate the Core Facility.

Individual pieces of equipment are listed below with their projected costs. The items are categorized as being used for nucleic acid work (DNA and RNA), proteins, cellular work, and equipment of general usage. Note that more than one item of key pieces of equipment (NMR, LC-MS, PCR) are to be purchased. There is no overlap of this equipment since they are needed by different groups within the Center for different purposes. In fact, with automated samplers for the LC-MS and long acquisition times for some NMR experiments, these instruments will be running samples 24 hours a day, seven days a week.

**Legend** – *A number of acronyms are used in the names of equipment. Definitions and a brief explanation of these are provided below.*

*NMR – Nuclear Magnetic Resonance; an instrument designed to assist in the elucidation of chemical structures.*

*LC-MS – Liquid Chromatography – Mass Spectrometer; an instrument designed to purify chemicals and simultaneously provide information on their chemical structure.*

*GC-MS – Gas Chromatograph – Mass Spectrometer; and instrument designed to purify volatile chemicals and simultaneously provide information on their chemical structure.*

*MALDI TOF MS – Time of Flight Mass Spectrometer; this is used to identify proteins by provide information on the amino acid sequence.*

*PCR – Polymerase Chain Reaction; a technique and instrument designed to provide large amounts of DNA from very small samples.*

*HPLC – High Performance Liquid Chromatograph; an instrument designed to purify complex mixtures of chemicals such as drug leads.*

*FPLC – Fast Protein Liquid Chromatograph; this is used for the purification of proteins.*

*French Press; this is used to rupture cells for protein or nucleic acid work.*

*Scintillation Counter; this is used to measure radioactivity.*

#### Nucleic Acid Work

\$105,000	Real Time PCRs (2 each)
\$21,000	HPLC
\$7,000	Spectrophotometer
\$18,000	Phosphoimager
\$50,000	Microarray System
\$20,000	Agilent Bioanalyzer

#### Protein Equipment

\$150,000	NMR
\$325,000	MALDI – TOF MS; High Resolution MS/MS

#### Microscopes

\$250,000	Electron microscope
\$25,000	Digital Microscope

#### General

\$30,000	Computers
\$8,000	Speed Vac
\$40,000	Ultra Centrifuge
\$30,000	High Centrifuge

#### Miscellaneous Supplies

\$330,000	Use to be determined based on project needs. This may be used to purchase equipment such as as confocal microscope (\$250,000).
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SUB-TOTAL \$1,506,000

#### *Marine Science Analytical Lab*

To conduct research on the development of biotechnological production methods of marine-derived medicines, the equipment listed below will be purchased. This includes instrumentation to elucidate structures of new chemicals as well as to isolate proteins.

\$200,000	NMR
\$160,000	LC-MS
\$120,000	MALDI TOF MS
\$55,000	Real Time PCR
\$50,000	GC-MS
\$25,000	FPLC
\$20,000	French Press
\$20,000	Fermentors
\$30,000	Scintillation Counter
\$40,000	Ultracentrifuge
\$30,000	High speed centrifuge
\$20,000	Gel Documentation system
\$30,000	Microscopes

\$30,000 Miscellaneous equipment including electrophoretic equipment,  
vacuums, incubator, cryogenic storage  
SUB-TOTAL \$830,000

#### *Biomedical & Marine Research*

The marine drug discovery facilities will be equipped with instrumentation to allow for the rapid purification and structure elucidation of new drug leads. All equipment is listed below. Key equipment includes an upgrade to an NMR to allow scientists to perform state-of-the-art experiments and for the purchase of an LC-MS.

\$250,000 Upgrade for 500 MHz NMR  
\$250,000 LC-MS  
\$100,000 Liquid sample handlers  
\$50,000 Preparative HPLC  
\$50,000 Real Time PCR machine  
\$75,000 DNA mini-prep robot  
\$25,000 Miscellaneous equipment (microscope, freezers)  
SUB-TOTAL \$800,000

#### **Research and Training:**

A significant amount of the funds will be used in graduate student and postdoctoral workforce training programs. The high caliber of science and novelty of the Center's research activities coupled with higher than average salaries is expected to attract the best applicants to this program. Postdoctoral fellows will receive a salary of \$35,000 - \$40,000 and graduate students will be paid \$20,000 - \$25,000. A sum of \$15,000 will be allocated to each trainee for his/her supplies, as well as to provide a modest travel allowance to attend scientific meetings. We aim to hire a total of 12-14 postdoctoral researchers (total of \$1,179,000 for two years;) and 16-18 Ph.D. students (total of \$894,000 for two years). These graduate and postdoctoral fellowships will be in all areas described in this grant application.

#### **Ship and Submersible Time:**

In order to investigate the relatively unexplored biodiversity of the deep water habitats off Florida, Harbor Branch will provide access to the Johnson-Sea-Link manned submersibles, and FAU will use its Autonomous Underwater Vehicles. The combined cost for the ships and submersible use is \$646,000. This will allow the Center to explore new habitats and discover new organisms that produce bioactive compounds and allow for the recollection of especially promising species.

#### **Seminars and Symposia:**

Regular seminar programs featuring the top researchers in areas of Functional Genomics and Marine Biotechnology will be held on various campuses of Center institutions. Scientists in each institution can participate in all seminars via video conference facilities. In addition, a two day symposium will be held at the new FAU Marine Science building on "Marine Drug Discovery and Development" to highlight the new facility and the implementation of the Center of Biomedical and Marine Biotechnology. A total of \$60,000 has been budgeted to fund these

programs. We will continue the seminar programs through regular institutional funding and donations from industry.

**Outreach:**

Marine Biotechnology Executive Education: funds will be used (\$100,000 year 1 and \$50,000 year 2) to cover salaries of three faculty and graduate student assistants to develop and execute this outreach component of the Center. A small portion of these funds (5%) will be used to purchase supplies for “hands on” exercises.

**Administration and Technology Transfer:**

FAU’s Office of Technology Transfer (\$350,000 per two years) will take the lead in coordinating the Center’s partners to establish an industry/economic development centric technology transfer initiative. This budget item includes estimated expenses for salary supplements, market research and intellectual property protection.

Enterprise Development Corporation will assist Center faculty and staff with the creation, growth and diversification of technology-based businesses. EDC has a process and support services in place to assist technology development from concept through commercialization, and will focus heavily on industry relations and the role of industry and economic development organizations in the development and commercialization of new products. EDC will work closely with FAU’s Office of Technology Transfer to coordinate efforts. \$150,000 is budgeted to supplement EDC staff to complete these tasks.

FAU is the lead institute for this Center and will provide the staff to coordinate Center activities. \$125,000 per year is budgeted for partial salary support, supplies, travel and phone.

**University of Central Florida  
Florida Photonics Center Of Excellence (FPCE)  
Budget Justification**

**Core Targeted Technologies:** nanophotonics, biophotonics, advanced imaging and 3D displays, and ultra-high bandwidth communications.

**Infrastructure: \$4.6 M (Centers of Excellence Grant)**

*Chaired Faculty Positions: \$4.6M*

We are proposing to add 5 Chaired Professorships as a result of the proposed effort. The world-leading scholars recruited will be magnets for attracting top graduate students, post docs, and grant support for internationally competitive research. We will establish 3 endowments using resources requested for FPCE and match this with 3 Trustee Chairs from UCF resources. The FPCE endowment and the Trustee Chairs will support a total of 5 Eminent Scholars (we will use a process modeled after the State's Eminent Scholars program for selection.) The Eminent Scholar appointments will provide key leadership to strengthen our capabilities in the FPCE core technology areas. One FPCE endowment will be used to fund 5 Professorships (3-year renewable terms) to reward those faculty members who best exemplify the objectives of the Florida Technology Development Act (TDA). These will be awarded by a joint panel of the FPCE Industrial Advisory Board, a non-UCF participant, and the FPCE Director.

An essential part of our strategy for the proposed COE is to use some of these non-recurring funds to build the foundation for a sustained effort through the recruitment of scholars whose creativity and energy produce the grant funding long after the TDA program is over. UCF will provide the recurring funds to support the Eminent Scholar Chairs. The endowments will support the Chairs with salary supplements and unrestricted funds for their work.

The "start up" funds for capital equipment are to provide initiation funds for the Endowed Chairs to be recruited. Our experience shows that \$500,000 to \$1,000,000 is required for initiation funds to capitalize the laboratories of leading senior faculty. UCF will provide the additional initiation funds if the amount needed exceeds the request amounts shown above.

*Nano-photonics Systems Fabrication Facility (NFSFF)*

A major goal of the FPCE is the establishment of a nano-photonics systems fabrication laboratory (NFSFF). The objective of this new facility is to move photonics from the vacuum tube to discreet components to integrated systems. The expectation is that this movement to nano-photonics will do for the optics industry what similar advancements did for the semiconductor industry from the 1960s to the present era. This facility will be a major resource for photonics research by all of Florida's universities, available for partnerships with Florida industry, and position UCF to compete nationally for the expansion of the NSF Nano-Fabrication Network. In summary the leveraged investment is as follows:

- \$1.5 M from UCF resources to renovate cleanroom space (UCF nano-initiative \$)
- \$2 M from the US DOD (approved in DOD budget for FY 03, \$3M expected in FY04).

This is all part of the matching funds for this effort and we have \$10 M of industry and federal support already in place to support this technology.

The UCF NFSFF addresses the national need for an educated workforce and revolutionary approaches to both technology and manufacturing methods used in photonic systems. NPSFF is a multidisciplinary unit that will combine the efforts of the School of Optics with those of the Advanced Materials Processing and Analysis Center (AMPAC), Electrical Engineering, Mechanical Engineering, Physics, and in the future, the BioMolecular Sciences Center. The focus will be on the development, integration, and packaging of devices for Photonics Systems. The methods will be based on those utilized in the integrated circuit industry for wafer fabrication and integration.

### **Targeted Research in the Core Technologies: \$4.5 M (Centers of Excellence Grant)**

A request for proposals will go out to universities in Florida for proposals in the core technology areas of the FPCE which are nano-photonics, bio-photonics, advanced imaging and 3D displays, and ultra-high bandwidth communications. These funds will support graduate student salaries, post-doctoral salaries, principle investigator salaries, capital equipment purchases, materials and supplies, as well as travel and publication costs. The specific breakdown of these funds will, of course, depend on what proposals are chosen for funding. In addition, considerable industrial matching funds will be expected from this RFP.

The Industrial Advisory Board (IAB), made up of Florida industry representatives, will be tasked with rating these proposals. Strong industry participation will be a strong component of the rating process. The FPCE IAB will focus on the effectiveness of research and education projects and will help the core/thrust Program Directors in decisions for starting, changing, level of support and discontinuing projects. The IAB will provide guidance on program/project goals, interactions with industry, intellectual property, external relations, project performance and system requirements, and they will get their information from management, personal observation, and from project reports prepared by researchers and educators. The board will compare status and performance with objectives, plans and priorities. We will rely heavily on these industries for advice as well as getting specific input from the Florida Photonics Cluster (the President will be on the Board). In addition we will be getting research funding from some of these companies that will be clearly directed. The continuing cooperation and collaboration with the UCF Technology Incubator will allow for the incubation of new businesses and the smooth transfer of technology from research to industry.

### **Center Development and Technology Commercialization: \$900k (Centers of Excellence Grant)**

#### *Partnership in Economic Development and Commercialization: \$700K*

FPCE is focused on the central idea of the TDA: growth of Florida's tech-based economy through the development of intellectual capital (educated people and research findings). The spinout of companies, the transition of technology, the aiding of existing industries and the attraction of new companies are not taken for granted and are not treated as an afterthought. This

is evidenced by UCF's leadership in establishing the Florida High Technology Corridor Council (FHTCC), the Central Florida Technology Partnership (CFTP), the UCF Technology Incubator, the new National Entrepreneur Center, and the Florida Photonics Cluster (an industry association). We are working with the City of Orlando, the Mid-Florida EDC, Orange and Brevard Counties, Enterprise Florida, and the previously mentioned organizations to grow Florida wealth-producing industries. Photonics is a centerpiece of our region and the State's effort to attract, retain and grow tech-based industries. UCF recently received a top-ten rating among the nation's tech incubators and an award of a \$600,000 National Science Foundation (NSF) innovation and entrepreneurship grant. UCF has also assumed a leadership role in the establishment of the National Entrepreneurship program by the US SBA. The budget for this is:

<b>FPCE UCF Incubator Support (\$200K/yr. for 2 years)</b>	<b>\$ 400k</b>
<b>FPCE Support of CFIC (\$100K/yr. for 2 years)</b>	<b>\$ 200k</b>
<b>FPCE Support of Partnership Activities (\$50k/yr. for 2 years)</b>	<b>\$ 100k</b>

The matching co-investment in the Economic Development and Commercialization includes:

UCF support of CFIC (150k/yr)	\$ 300k
City of Orlando (\$100k/yr. for 3 years)	\$ 300k
Orange County (\$100k/yr. for 3 years)	\$ 300k
SBA National Entrepreneurship Center	\$ 1M
Disney Match for the NEC	\$ 1M
Investment in Inflexion	\$ 50k
UCF Support of the UCFTI (\$500k/yr.)	\$ 1M
FHTCC Matching Program	\$ 400k
NSF Entrepreneurship Grant Photonics	\$ 600k

The leveraged resources and partnerships listed above ensure the critical mass effort needed to make a difference in Florida's high wage, high-tech economy. The requested funds for the FPCE will focus and enhance the considerable investment of our region in the shared objective of technology commercialization and diversification of our economy.

*Outreach and Workforce Development: \$200k*

One of the most important factors associated with this proposal is that UCF will build upon the School of Optics/CREOL known for its excellence, and add the Florida Photonics Center of Excellence. Obviously the School of Optics is supplying a significant number of masters level and Ph.D. level employees. In addition CREOL is working in partnership with the Department of Engineering Technology to develop a 2+2 technical degree (4-year degree). This is being accomplished with Community College partners. Several high school students have already done internships in the research labs in CREOL. Other means of education are the close ties between the School and the Orlando Science Center which tours thousands of school kids hopefully inspiring their interest in science. (e.g. CREOL students helped design the light-power exhibit).

FPCE's educational and outreach programs will be integrated into the School of Optics and seek to provide students with an integrative, systems-oriented background in the core technologies. The purpose of the education and outreach programs is to disseminate new knowledge created in FPCE to local industry, to undergraduates, to graduate students, and to the public, including K-12 students, teachers, education majors, community college science instructors and life-long learners.

Some of the tools and techniques for accomplishing these goals include:

- Nation-wide internet/video conferencing: Courses in all the above programs will be made available to students around the state (at other colleges and at industrial sites) via FEEDS, live or streaming video.
- A year-round Undergraduate Research Opportunities Program (UROP) for students in the Metro Orlando area
- Summer Research Experiences for Undergraduates (REU) for non UCF students around the State of Florida
- Photonics Tech Camp for Teachers (in collaboration with the Florida Photonics Cluster and other organizations)
- Programs for all learners: *Women in Science and Engineering (WISE)*: FPCE will promote recruitment and retention of undergraduate Women in Science and Engineering (WISE), with an emphasis on pipelining them into graduate programs.

**University of Florida**  
**Center of Excellence in Regenerative Health Biotechnology**  
**Budget Explanation**

The budget presented here is a revision of the original. This revision is based on our initial consultation with the Facilities and Planning Department at the University of Florida (UFF&P). After their brief survey of the project, they have suggested that certain items are more appropriately placed in the renovation budget and others in the equipment budget, hence the discrepancy from the original. What is presented here is based on the best information available prior to contracting with an architect who will be hired once the funds become available.

**Renovation**

The project is based on the renovation and equipping of two buildings that have been purchased by the University of Florida at a cost of \$3.6 million. These structures will house several bio-processing activities related to regenerative health. Our initial estimate is that the renovation and retrofitting of the physical plant will require \$5,178,774. These costs have been broken out into various subcategories that have been determined by the UFF&P.

**Personnel**

Several personnel will be hired over the two-year period of the grant. A consultant in regulatory affairs, well versed in Food and Drug Administration (FDA) regulations, will work with the architects to ensure that the structure can support processes that will be consistent with the FDA current good manufacturing practices (cGMP). A second person hired mid-year of year one will serve as the facility manager and coordinate the activities involved in the renovation and installation of equipment. A secretarial assistant will be hired in the second year. At the expiration of the grant, the salaries of these two persons will be paid from revenues produced by the facility.

**Equipment**

Sufficient equipment will be installed in the fermentation facility so that 4 projects of varying scale can be in process at the same time. This is the reason for the duplications of certain devices. This is expected to be the most active category and thus has required the largest investment.

The equipment for the gene vector facility has been identified in consultation with the selected licensee who will operate the facility. They have indicated that they will be supplying considerable equipment, which they already own. This has enabled us to reduce the original

estimate for equipping the vector lab and we have been able to enhance the capacity and efficiency of the vector production by the equipment that we will supply.

A basic mammalian cell culture and adult stem cell culture facility will be equipped to serve several simultaneous projects. This, along with the internal cell culture capability of the gene vector facility, will provide adequate service for the intended purposes. Sufficient space has been reserved for eventual expansion of this facility.

### **Tutogen Medical**

This company will require on minimal resources from the center in order to upgrade the containment rooms needed for the processing of bone and connective tissue allografts that they manufacture for you in orthopedic reconstructions. They have agreed to bear an additional cost that might be required to have their facility fully operational on a fast track.

### **Teaching Facilities**

A current research lab and a conference area will be minimally remodeled for the use of Santa Fe Community College (SFCC) for their biotechnology and bioprocessing training program. Most of the expenses needed to make these functions will be borne by SFCC.

### **Technology Transfer**

An office area will be provided for short and long-term use by the UF Office of Technology Licensing as well as other groups that may need to interact with new companies located in the area. This might include patent attorneys, venture capital firms or local governmental agencies involved in economic development.

### **NASA Liaison Office**

This space is being provided for NASA scientists from Kennedy Space Center or elsewhere who might be involved in projects related to center activity. There is already considerable collaboration between UF and NASA and we expect this to increase based on their growing interest in bioprocessing.

### **Start-up Costs**

These costs include the final stages of systems installation and integration and systems testing. This will be necessary to assure that all of the licensees will be able to meet cGMP standards of

production. It will also be necessary to develop a set of SOPs for the building itself in support of the actual production, as well as develop a set of quality assurance guidelines for the building management so that required performance standards are not compromised. At this time we are unable to determine if this can be done internally, internally with consultants, or by an outside group. We have been advised by industry specialists that the monies we have budgeted should be appropriate for these purposes.