



# USF CONNECT

2008/09

## Awarded External Matching Grant Projects

### Summary

During the 2008/2009 fiscal year, the USF External Matching Grant Program reviewed 24 projects with 20 companies. The awards total \$983,613 and include \$1,531,995 in cash match and \$2,162,006 in-kind match for a total investment of \$4,677,614 in the program. The average total project value was \$194,901 and the average award was \$40,984. 76 students and 39 faculty have been supported by these funds.

Projects were reviewed from the College of Engineering (12), College of Arts & Sciences (4), College of Medicine (4), College of Business (2), College of Education (1) and the College of Public Health (1).

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Steimle, Eric, *"Study of Unmanned Surface Vehicles for Environmental Monitoring of Natural and Manmade Waterways in the State of Florida"*

Department: Environmental Science & Policy – St. Petersburg Campus

Sector: Microelectronics/Nanotechnology

Partner: AMJ Environmental, Inc.

Location: St. Petersburg, Pinellas County

FHTC Award: \$31,602

Cash Match: \$31,603

In-Kind Match: \$38,800

Total Project Cost: \$102,005

Students: 4

Faculty: 1

Abstract:

The project will involve the modification of a small USV from AEOS. The modifications will be to incorporate a YSI 6600v2 sonde for water quality parameters and a Sontek mini-ADP to measure water currents. Software will be developed for mapping and monitoring. This software will be based on software packages currently in use by AMJ. Surveys of lakes and rivers in Central Florida will be performed and input from State and county environmental agencies will be sought to develop the necessary reporting tools.

Mohapatra, Shyam, *"Targeted Delivery of siRNA Nanoparticles to Prevent HIV-1 Transmission"*

Department: Internal Medicine

Sector: Life Sciences

Partner: Transgenex Nanobiotech, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$66,150

Cash Match: \$66,150

In-Kind Match: \$93,800

Total Project Cost: \$226,100

Students: 4

Faculty: 2

Abstract:

The search for a novel prophylaxis/therapy against HIV has intensified, since a safe and effective AIDS vaccine remains difficult to develop and won't be available in this decade. Small interfering RNA (siRNA) has emerged as a powerful tool in gene silencing, and preclinical studies have shown promise in treatment of viral infection and cancer. The proposed project is aimed at successful delivery of anti-HIV siRNA nanoparticles to prevent HIV-1 replication *in vitro* and will help us in non-human primate studies or preclinical trials in the future.

Tan, Jun, *"Oral Administration of TeaMem Inhibits Alzheimer's Disease Pathogenesis"*

Department: Psychiatry & Behavioral Medicine

Sector: Life Sciences

Partner: Natura Therapeutics, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$46,875

Cash Match: \$46,875

In-Kind Match: \$155,994

Total Project Cost: \$249,744

Students: 3

Faculty: 3

Abstract:

In this project, oral administration of green tea-EGCG (TeaMem™) will be employed to mice before and after the development of Alzheimer's disease-like pathology. The mice will then be tested to examine the histologic and biochemical effects. Furthermore, following more long-term TeaMem™ administration, cognitive testing will be done. Groups will be compared by their effects on reducing Alzheimer's disease-like pathology and opposing behavioral impairment. These studies could lay the foundation for Alzheimer's disease clinical trials with pure TeaMem™ in the near future.

Sunol, Aydin, *“Development of Novel Polymer Nanocomposite Materials”*

Department: Chemical Engineering

Sector: Microelectronics/Nanotechnology

Partner: Advanced Material Technology, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$17,000

Cash Match: \$17,000

In-Kind Match: \$17,000

Total Project Cost: \$51,000

Students: 2

Faculty: 1

Abstract:

The goal in this project will be the development of advanced polymers with enhanced and tunable properties, in particular, thermal properties (coefficient of thermal expansion (CTE) and thermal conductivity) and mechanical properties (strength, toughness and energy absorption capability)

Brinkmann, Bob, *“Brownfields Mapping & Analysis in the East Tampa Neighborhood”*

Department: Geography

Sector: Information Technology

Partner: Tampa Bay Engineering, Inc.

Location: Clearwater, Pinellas County

FHTC Award: \$10,000

Cash Match: \$20,000

In-Kind Match: \$20,000

Total Project Cost: \$50,000

Students: 11

Faculty: 1

Abstract:

The purpose of this project is threefold: 1) identification, mapping and data collection in brownfields areas; 2) evaluate available local health data (access to healthcare, disease disparities) and the relationship to brownfields; and 3) participate in community engagement efforts on brownfields within the community. The significance of this project is that it brings together researchers and students from the University of South Florida, City of Tampa community experts, and citizens to examine spatial characters and community influences of brownfields within the City of Tampa with a specific focus on human health. The research will include scholarly research and analysis and community engagement projects to fully understand the geographic characteristics of brownfields within the study area. A geodatabase, reports, maps and scholarly papers will be products produced through this work. It is also anticipated that at least one master's thesis will be produced.

Milhous, Wilbur, "*Application and Validation of Photonics Method for Diagnosis of Malaria*"

Department: Global Health

Sector: Life Sciences

Partner: Claro Scientific, LLC

Location: St. Petersburg, Pinellas County

FHTC Award: \$61,429

Cash Match: \$61,429

In-Kind Match: \$61,429

Total Project Cost: \$184,287

Students: 2

Faculty: 1

Abstract:

The main objective of this proposal is the determination of the optical properties of *P.falciparum* for their use in Claro's minimally invasive technology for malarial detection and identification in whole blood. The second objective is to establish the comparison between existing Claro's current field data sets and laboratory based malarial cell culture requirements. The third objective is the comparison between several strains of *P. falciparum* in cell culture with other species of *Plasmodium*.

Fountain, Michael, "*Demand Aggregation & Yield Management*"

Department: Center for Entrepreneurship

Sector: Information Technology

Partner: eWinWin, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$35,000

Cash Match: \$35,000

In-Kind Match: \$35,000

Total Project Cost: \$105,000

Students: 4

Faculty: 1

Abstract:

Conduct primary research to determine where the technology can be most successfully commercialized in ancillary markets, including the implications for the Tampa Port and imports/exports. An analysis of pricing solutions and the unique aspects our technology will be initiated at the beginning of the program. The students will be tasked with initiating actual live solution collection in real-time data.

Joseph, Babu *“Development of Phase Change Materials”*

Department: Chemical Engineering

Sector: Microelectronics/Nanotechnology

Partner: TempTroll, LLC

Location: Tampa, Hillsborough County

FHTC Award: \$31,250

Cash Match: \$62,500

In-Kind Match: \$75,000

Total Project Cost: \$168,750

Students: 3

Faculty: 2

Abstract:

The objective of this work is to design and develop experimental systems that will enable determination of reaction rates, heat transfer characteristics, and mass transfer rates for reacting systems that involve self heating and cooling systems.

Sarkar, Sudeep, *“Avatar DNA Using Biometrics and User Access Controls”*

Department: Computer Science & Engineering

Sector: Information Technology

Partner: Raytheon, Inc.

Location: St. Petersburg, Pinellas County

FHTC Award: \$15,000

Cash Match: \$31,500

In-Kind Match: \$30,000

Total Project Cost: \$76,500

Students: 2

Faculty: 2

Abstract:

Raytheon would like to investigate concepts in developing a secure virtual world. In particular exploring the security features associated with the Avatar DNA using the combination of a biometric attribute (i.e. finger/thumb, palm face and or iris) and logical access controls mechanisms such as user privileges, profiles, and auditable actions bound together to create the unique accountability of individuals during a login session within the virtual world.

Turos, Ed, "*Anitbacterially Active Nanoparticles*"

Department: Chemistry

Sector: Life Sciences

Partner: Nanopharma Technologies, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$50,001

Cash Match: \$50,001

In-Kind Match: \$54,400

Total Project Cost: \$154,402

Students: 2

Faculty: 1

Abstract:

During this phase, the goal is to: 1) to determine the stabilities of penicillin nanoparticles (two drug-conjugated and two drug-embedded) under various chemical and biological conditions; 2) to evaluate potential *in vitro* and *in vivo* toxicity of the nanoparticles; 3) to examine the bio-distribution of the two most active nanoparticles in healthy mice; and 4) to assess the effectiveness of the most potent penicillin-embedded and penicillin-conjugated nanoparticles in treating both early stage (skin) and advanced (systemic) MRSA infections in mouse models. The goal of this study is providing both fundamental data to the scientific community on these polyacrylate nanoparticles as a drug delivery platform, as well as animal testing data needed to advance this nanoparticle technology towards IND and FDA approval.

Wang, Jing, "*Enhanced Characterization Techniques for Transistor and Amplifier Modeling*"

Department: Electrical Engineering

Sector: Microelectronics/Nanotechnology

Partner: Modelithics, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$17,002

Cash Match: \$17,609

In-Kind Match: \$17,002

Total Project Cost: \$51,613

Students: 4

Faculty: 4

Abstract:

The goal of this on-going project will be to characterize (measure) example microwave devices and construct and verify improved models for high frequency transistors, such as Heterojunction Bipolar Transistors (HBTs) as well as field effect transistors of multiple types such as GaN HEMT, SiC MESFET, GaAs pHEMT, and Silicon MOSFET (LDMOS and VMOS). These models are to be tailored for use in circuit simulation software such as Agilent ADS. Both frequency and time domain simulation capability is of interest. A goal will be transfer of developed techniques and complete modeling examples to Modelithics through collaborative interaction between Modelithics' engineers and USF students/faculty.

Wang, Jing, *"Uncooled Nanoscale Infrared High-Speed Sensors for Missile Seeker Applications"*

Department: Electrical Engineering

Sector: Microelectronics/Nanotechnology

Partner: NanoCVD Co.

Location: Tampa, Hillsborough County

FHTC Award: \$76,154

Cash Match: \$76,155

In-Kind Match: \$153,779

Total Project Cost: \$306,088

Students: 3

Faculty: 2

Abstract:

There is a growing need for multi-spectral infrared detectors for advanced missile seekers with better target discrimination and identification. Multicolor capabilities, high detectivity and quick response are highly important for advanced infrared sensor systems. The company proposes developing uncooled high-speed detectors consisting of a microstrip-patch-antenna or dielectric-rod-antenna in conjunction with nanoscale metal-insulator-metal tunnel diode (MIMTD), which can be efficiently used in missile seekers and commercial applications. In these assemblies, a microantenna amplifies the incident electromagnetic radiation, and the induced infrared frequency voltage is rectified by the MIMTD generating a useful signal. Successful deployment of uncooled infrared high-speed sensors in accordance with the proposed effort will open up a wide range of applications ranging from missile seeker applications to driver's night vision enhancement.

Mullins, Gray, *"Geothermal Well Evaluation: Instrumentation, Monitoring and Modeling of HVAC/Geothermal Wells"*

Department: Civil & Environmental Engineering

Sector: Other

Partner: Coastal Synergy Corporation

Location: Odessa, Hillsborough County

FHTC Award: \$37,496

Cash Match: \$37,497

In-Kind Match: \$430,539

Total Project Cost: \$505,532

Students: 2

Faculty: 2

Abstract:

The proposed study will entail thermal modeling of various geothermal well configurations, the instrumentation and monitoring of active heat transfer wells, and the optimization of systems for various soil conditions and well diameters. This is a joint research project with USF and Coastal Synergy Corp. to identify the most environmentally safe and efficient coolant mediums to be used to for the geothermal cooling system. The joint research will also be conducting investigating the use of solar photovoltaic panels to supplement the power source for the geothermal heating/cooling system and component parts such as chillers, pumps and solar water heater collector panels, etc.

Sagues, Alberto, *“Mechanistic Issues on Corrosion Performance of Dual Polymer-Zinc Coater Rebar”*

Department: Civil & Environmental Engineering

Sector: Other

Partner: Gerdau Ameristeel Corporation

Location: Tampa, Hillsborough County

FHTC Award: \$49,497                      Cash Match: \$200,000                      In-Kind Match: \$264,652

Total Project Cost: \$514,149

Students: 5

Faculty: 1

Abstract:

The work proposed seeks to examine mechanistic issues that are critical to long term corrosion performance of DCR (dual-polymer-zinc coated rebar), but that have not yet been explored in detail. The project will address DCR performance compared to that of other corrosion resistant reinforcements, in highly aggressive marine substructure applications which are known to test the corrosion resistance limits of any candidate rebar material. The objectives of the investigation are to 1) determine the mechanism of corrosion resistance of DCR, and 2) integrating mechanistic information with findings from the FDOT/FHWA work into durability performance projections suitable for comparative life cycle analysis as function of service conditions.

Padmanabhan, Balaji, *“Demand Aggregation: Search Technology & Social Buying Analysis”*

Department: Information Systems/Decision Sciences

Sector: Information Technology

Partner: eWinWin, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$50,000                      Cash Match: \$50,000                      In-Kind Match: \$50,000

Total Project Cost: \$150,000

Students: 3

Faculty: 1

Abstract:

The proposed project would 1) Design a prototype solution that shows how consumers might utilize search mechanisms to find current group-buying offers or groups trying to put together offers using a dedicated B2C site and working from eWinWin’s functional specifications 2) Design a prototype solution that shows how consumers could incorporate search in a distributed environment along with the incorporation of advertising methodologies utilizing eWinWin’s product functional specifications and 3) Apply the latest social pricing theories in a real-life B2C site dedicated to expanding the utility and value of eWinWin Technology for sellers and buyers. Collect data, track impact of model on social buying behavior, and determine meaningful theories for publication.



Nicosia, Santo, *“Development of IVECT™-Encapsulated Gemcitabine for the Treatment of Pancreatic Cancer”*

Department: Oncologic Services

Sector: Life Sciences

Partner: Intezyne Technologies, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$37,485                      Cash Match: \$37,485                      In-Kind Match: \$110,000

Total Project Cost: \$184,970

Students: 1

Faculty: 2

Abstract:

The goals of this project are to determine anti-tumor activity, toxicity profile, and overall characteristics for the new gemcitabine formulation compared to the standard drug. Mouse models of pancreatic cancer will be used to achieve these goals.

Sunol, Aydin *“Development of Temperature Modulated Products”*

Department: Chemical Engineering

Sector: Microelectronics/Nanotechnology

Partner: TempTroll, LLC

Location: Tampa, Hillsborough County

FHTC Award: \$31,250                      Cash Match: \$62,500                      In-Kind Match: \$75,000

Total Project Cost: \$168,750

Students: 3

Faculty: 2

Abstract:

The objective of this project is to design and develop prototypes of experimental self heating and cooling chemical products. The prototype systems and development will focus on biomedical, food, pharmaceutical and advanced material applications.

Jiang, Xiomei, "*Development of Semitransparent Flexible Power Foil (SEPF) for Smart Window Technology*"

Department: Physics

Sector: Sustainable Energy

Partner: New Energy Solar Corporation

Location: Tampa, Hillsborough County

FHTC Award: \$150,000      Cash Match: \$441,149      In-Kind Match: \$251,000

Total Project Cost: \$842,149

Students: 2

Faculty: 2

Abstract:

The goal of the project is to produce the prototype flexible *semi-transparent* organic power foil for a energy-generating window glass in building integrated photovoltaic products. The technology developed in the prototype device will be ready for large scale, roll-to-roll, and low cost industrial manufacturing. The objective is to modify the current complicated and costly processing techniques such as vacuum deposition, area-limited spin-coating process, and photolithography, while maintaining the device performance in field application environments.

Harmon, Julie "*Ruggedized Thermal Battery Polymer Composites*"

Department: Chemistry

Sector: Microelectronics/Nanotechnology

Partner: Enser Corporation

Location: Pinellas Park, Pinellas County

FHTC Award: \$25,000      Cash Match: \$25,000      In-Kind Match: \$25,000

Total Project Cost: \$75,000

Students: 2

Faculty: 1

Abstract:

The overall goal of the project is to develop and test new header encapsulation materials for thermal batteries by characterizing the standard baseline epoxy in terms of chemical composition, density, hardness, thermal properties, electrical resistivity and the speed of the curing process. Headers will be encapsulated using the best of the polymeric material candidates to assess bonding ability to the header and ease of using the material in a manufacturing process.

Tan, Jun *“DiosMem™, a Natural Gamma-Secretase Inhibitor, opposes AD Pathogenesis”*

Department: Psychiatry & Behavioral Medicine

Sector: Life Sciences

Partner: Natura Therapeutics, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$56,250

Cash Match: \$56,250

In-Kind Match: \$109,004

Total Project Cost: \$221,504

Students: 3

Faculty: 1

Abstract:

Flavonoid-diosmin (DiosMem™) will be orally administered to Tg2576 mice (an Alzheimer mouse model) before (prophylactic treatment group) development of AD-like pathology. Groups of untreated non-transgenic littermates will be compared to the transgenic treatment groups. Oral administration of DiosMem™ to Tg2576 mice will be performed for 6 months. **Aim 1**, following the administration, cognitive testing will be done at several ages. **Aim 2**, we will sacrifice these mice at several ages to examine histological and biochemical endpoints and correlate pathological changes with improvement of cognitive impairment. In this study, we plan to evaluate two time points comparing DiosMem™ to control. Groups will be compared by their effects on opposing cognitive impairment and reducing AD-like pathology. These studies could lay the foundation for AD clinical trials with DiosMem™ diet supplementation in the near future.

Weller, Tom *“Low Cost Omni Antenna Design”*

Department: Electrical Engineering

Sector: Aviation & Aerospace

Partner: Raytheon Company

Location: St. Petersburg, Pinellas County

FHTC Award: \$15,087

Cash Match: \$30,005

In-Kind Match: \$20,000

Total Project Cost: \$65,092

Students: 6

Faculty: 1

Abstract:

The work proposed herein aims to advance the fundamental knowledge base concerning microwave sensor/communications systems that are in direct contact with non-planar support structures. The specific technical objectives of this project are to i) investigate the integration of high-quality ferroelectric thin-film devices into flexible, multi-layer polymer substrates; and ii) advance the state of the art in thin, frequency-tunable planar antenna design.

Dekker, Don *"A Synergistic Project to Develop Infrastructure to Test and Develop Innovative Rehabilitation Technologies"*

Department: Mechanical Engineering

Sector: Life Sciences/Medical Technologies

Partner: Rehab Ideas, Inc.

Location: Tampa, Hillsborough County

FHTC Award: \$47,495

Cash Match: \$47,505

In-Kind Match: \$47,500

Total Project Cost: \$142,500

Students: 1

Faculty: 2

Abstract:

This project will focus on two goals 1) to evaluate the application of a marsupial robotic base for use as an aide for individuals with disabilities and 2) test and develop standards for wheelchair accessories, specifically the Off-Road Wheelchair Kit, The TrayAway and the Backpack Retriever (all products were developed at USF and currently being commercialized by Rehab Ideas.