

UGPN Research Collaboration Fund

2015-16



UGPN
University Global Partnership Network

Understanding CaPP Deposition Disease (Pseudogout); Molecular Modeling & Simulation (Trilateral)



Overview

This project sought to understand the nucleation and growth of Calcium Pyrophosphate (CaPP) crystals within synovial fluid. The main goals of this UGPN project were geared toward establishing a computational framework to understand the formation of CaPP crystals in synovial fluid.

Outcomes

- Workshop on molecular interactions and nanobiological applications, USP
- STAMiNA network established with Partners from USA, Sweden, Brazil, Italy and France
- Staff and student visits
- 3 publications in preparation
- 2 funding applications in preparation

Future activity

The team continue to work on both aspects of the project (development of models for CaPP, and for proteins and polyelectrolytes at constant pH). The next steps will be studying the nucleation of CaPP under different conditions of pH and electrolyte concentrations, in the presence of surfaces and moieties present in synovial fluid.

Key contacts:

Prof Erik E Santiso,
NCSU
Prof Fernando Barroso
da Silva, USP
Prof Richard Sear, UOS

Tri-lateral: Towards the Treatment of Aerosol Emissions from Biomass Burning in Chemical Transport Models (BIOBURN) (Trilateral)



Overview

The aims of the project were to develop a fundamental understanding of aerosol particle emissions from non-vehicle sources (i.e., biomass burning) and synthesize their physical and chemical properties through experimental investigations, and develop a sub-module to treat these sources in the numerical modelling tools such as WRF/Chem, followed by a demonstration through a case study for the city of Sao Paulo. The other key objectives were to foster student and staff mobility

Outcomes

- Monitoring data obtained
- Model simulation carried out
- Student and staff mobility
- Post-doctoral researcher mobility
- Project workshop held at each Partner
- 2 published journal articles
- 4 publications in preparation
- Funding applications in preparation
- Funding awarded from NOW-FAPESP-ESRC

Future activity

The team will continue working together to complete and submit articles in preparation. We are constantly looking for further funding opportunities from the UK-USA-FAPESP sides to secure further funding. We already have two on-going projects (ASTRID and NEST-SEAS).

Key contacts:

Prof Maria de Fatima Andrade, USP
Prof Yang Zhang, NCSU
Prof Prashant Kumar, UOS



White-brown fat plasticity and metabolic inflammation in obesity and diabetes (Bilateral)

Overview

This project focused on establishing a new synergistic interdisciplinary research team among NCSU (Komarnytsky) and USP (Festuccia) in the area of metabolic inflammation, lipid metabolism, bioenergetics, and human health. The ultimate goal of this project was to understand the role of resident macrophages in adipose tissue, maintenance of healthy lipid metabolism, and their dysregulation in obese and diabetic states.

Outcomes

- Staff and student mobility
- 5 published journal articles and a further 2 accepted for publication
- 4 external funding awards

Future activity

A four-way collaborative team among NCSU, USP, Surrey, and Wollongong has been developed, with a successful bid submitted for funding in the next round of UGPN projects.

Key contacts:

Prof Slavko Komarnytsky, NCSU
Prof William Festuccia, USP

Characterization of Organic Scintillator Response to Fast Neutrons for Detection and Identification of Special Nuclear Material (Bilateral)



Overview

The NCSU Department of Nuclear Engineering and the Surrey's Department of Physics collaborated with the Department of Physics at Duke University to conduct and analyse experiments to characterize the response of the crystalline organic scintillator material stilbene. Solution-grown stilbene is a relatively new organic scintillator that possesses several characteristics that make it an excellent fast neutron detector, including high scintillation efficiency and good neutron-gamma discrimination.

Outcome

- Long-term collaboration deeded between NCSU and Surrey in radiation measurements
- Results published in Symposium on Radiation Measurements and Applications (SORMA) in California, May 2016
- Publication drafted for Nuclear Instruments and Methods
- Joint proposal in development

Future

The team plan to collaborate on the characterization of other organic scintillator materials using the experimental apparatus constructed for this UGPN project.

Key contacts:

Prof John Mattingly,
NCSU
Prof Paul Sellin, UOS

Green Infrastructure Research Development for Stormwater and Air Quality (Bilateral)



Overview

Green Infrastructure (GI) is a stormwater treatment strategy in urban corridors. GI offers multiple benefits including urban flood mitigation and water quality improvement. However, many of these benefits are yet to be well understood, and more importantly, quantified. The project team from NCSU and Surrey took the first steps in developing a joint GI research team to (1) investigate the benefits of green infrastructure, (2) communicate GI findings, and eventually (3) devise design standards for the wider engineering and regulatory communities.

Outcome

- Two publications in preparation focusing on the link between stormwater green street technology and air quality benefits.
- A publication currently under review addressing a linkage between natural capital with green infrastructure.
- Three proposals developed and submitted to external funding bodies

Future

Linking two key aspects of green infrastructure (stormwater management and air quality control) is expected to be a fertile ground for research and publications in the coming years.

Key contacts:

Prof William F Hunt,
NCSU
Dr Jonathan
Chenoweth, UOS
Dr Prashant Kumar,
Surrey

Green Composites from Tururi Fiber and Soy-Based Resin (Bilateral)



Overview

The research deals with developing a program for a MS Student (Ms. Amanda Sousa Monteiro) at the USP, who will visit NCSU for 6 months. The student will be trained on composite manufacturing and evaluation equipment available at the Composite Core Facility. The research program targets developing 3D composites from natural resources abundantly available in Brazil and USA (Tururi fiber and soybased resin) as an alternative to those composites from the ever depleting petroleum-based materials.

Outcome

- Master student Amanda Souza Monteiro visited NCSU from 21 August to 15 December 2015
- The work was presented at the 5th Smartex 2015 Egypt (World Textiles Conference) held November 23-25, 2015, Kaferelsheikh University, Egypt
- A scientific paper was submitted to the journal "Composites - Part B: Engineering"
- Professor Seyam visited Brazil March 5-12, 2016

Future

Future collaborations are expected mainly in textile and composites research common projects.

Key contacts:

Prof, Dr Abdel-Fattah
M. Seyam, NCSU
Dr Julia Baraque
Ramos, USP