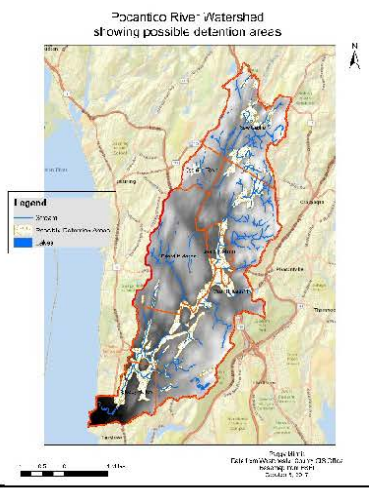
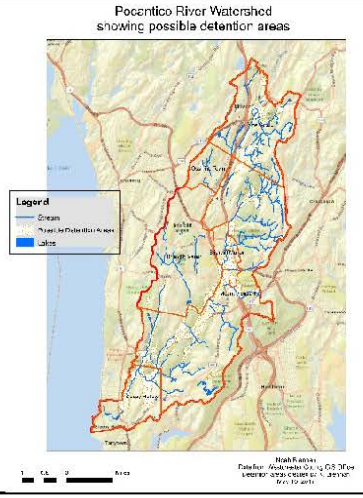
Using LiDAR to identify possible stormwater detention areas in the Pocantico Watershed

Professors Nicholas Robinson & Peggy Minnis

GIS Students

Noah Brennan
Kim Castaldo
Marisa Flannery
Ralph Green
Kaila Williams
Ethan Kravitz
Rebecca McMann
Anthony Pennella
Charles Steele
Paola Idrovo





• Purpose and Goal

The purpose of the project was to help local communities plan for Stormwater detention, using topographic analysis, enabled by light detection and ranging (LiDAR) data for the watershed. Parcels with housing or businesses were eliminated and most of the areas that were determined to be suitable were owned by the NYS DOT, the towns or by nonprofit agencies. The remaining low spots can be considered for various stormwater detention methods.

Develop students' GIS skills

Establish student/community relationship

Use current technologies to solve problems

Understand town/town interaction issues

Mitigate flooding in congested areas

Establish the need for watershed cooperation

Give students an opportunity to present their work in a welcoming student/faculty arena

Structure of Physical (R)evolutions and Quantum Spacetime

Mohsen Shiri-Garakani, Ph.D.

Assoc. Prof. of Physics

Pace University, Pleasantville

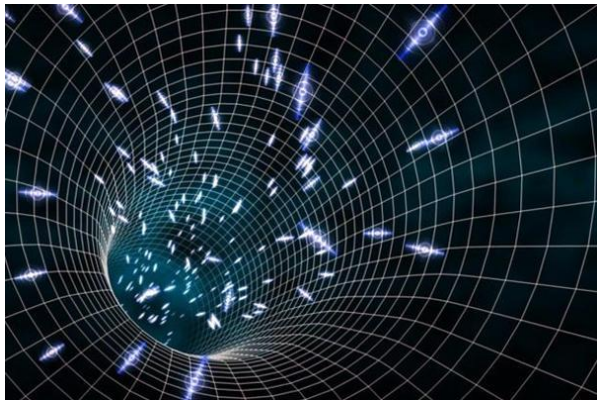


Photo courtesy: www.dailygalaxy.com

The three main revolutions of physics in the twentieth century (i.e., special and general theories of relativity, and quantum theory) have a suggestive family resemblance: while unifying previously disjoint fundamental concepts, each introduced a certain non-commutativity formerly not present in physics. We study mathematical, physical, and philosophical aspects of the general pattern governing these evolutions and use the main idea to develop a quantum theory for spacetime, a long sought-after quantum theory aiming at unifying spacetime (gravity) and elementary particles (Standard Model). We show that major revolutions in physical theories are actually instances of a general reformation (evolutionary) process.

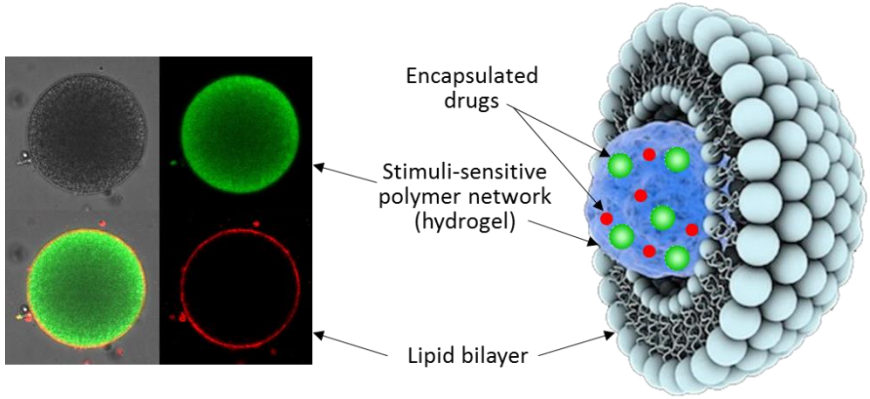
Physicists have worked on developing a unified quantum theory for spacetime (gravity) for decades. While the popular candidate (String Theory) has got much of the attention, it has failed to produce a promising theory. Inspired by Irving Segal's doctrine that physical theories must be described by semi-simple Lie algebras, our approach focuses on symmetry structure of major theories of physics We follow David Finkelstein's general idea that algebra simplification leads to unification. We aim at unifying gravity and elementary particles at the fundamental level while unifying symmetry groups of these theories within a large but finite Clifford algebra, which reproduces the former non-unified theories in appropriate limits.

BIOSCOPIC LIPOBEAD-ENCAPSULATED ANTICANCER DRUG

Participants

PI: Dr. Sergey Kazakov
Students:
Sarah Rahni'18
Cesar Ramirez'18
Gregory Vance'18

Pace University



Overall Goal/Purpose

Cancer is one of the most dangerous illnesses on Earth, because mortality in patients with solid malignant tumors is caused mainly by tumoral metastases. The ultimate goal of our research is to develop the so-called bioscopic anticancer chemotherapy with superior tumor response and minimum side-effects even at a greater drug loading concentration. Lipobeads (lipogels) is a good candidate for the conceptually new drug delivery system with delivery, release, and activation of anticancer agents regulated by bio-signaling. [Kazakov S. *Current Pharmaceutical Design* 2016, 22, 1391-413]

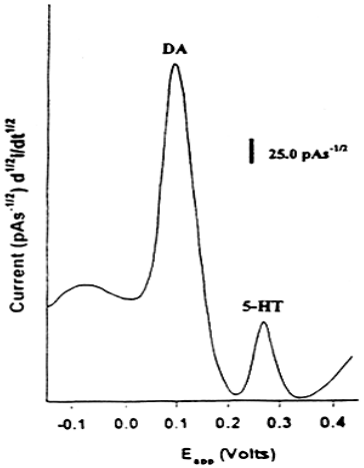
Specific Research Aims

We aim at preparing the temperature-sensitive and fluorescent lipobeads and study their stability, permeability, drug loading and release at different temperatures

- Lipobeads could demonstrate an efficient encapsulation of a wide variety of drugs, biocompatibility, passive targeting to tumor or inflammation sites, availability of the external surface as a modification site for prolongation of circulation time and active targeting, no adverse reactions at the site of IM or IV injection
- Bi-compartmental structure of lipobeads could provide a number of novel and unique options such as a consecutive multistep triggering,, new schemes of drug release, and combined drug delivery

BIOSENSORS

- **Professor David N. Rahni, Ph.D.**
- Dr. Patricia Broderick CUNY
- Dr. Stephen D. Pastor BASF
- Dr. Sean Zhao BASF
- **Bio-electro-Analytical chemistry**
  Method development for clinical, environmental, forensic & neuroscience assays, and for nano-engineered devices.



- To immobilize an enzyme or an antibody onto an electrochemical transducer for *in vivo/ex vivo/in vitro* assay of key neurotransmitters. drug delivery and disease control, anchored on a biocompatible implantable device.
- To preside over symposia, and report on forensics and neuro-psycho- pharmacological advances at Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy.
- Rahni et al, ***Bioimaging in Neurodegeneration***

A symbiotic integration of a specific enzyme or antibody, with an electroactive or optical transducer of resolved selectivity, when complemented with real time computational data acquisition analytics, should yield a highly sensitive and specific implantable device for monitoring key blood metabolites or *in vivo* neurotransmitters for target sub-micromole ($M<10^{-6}$) concentration delivery of a medication to a specific bodily organ.

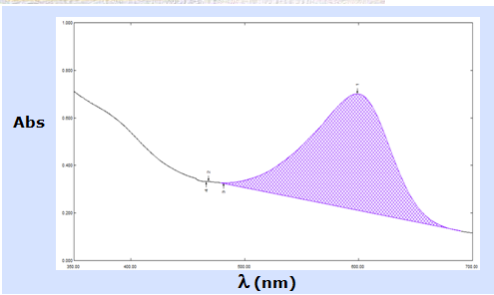
Read/watch Rahni's interview on Huffington Post

Remediating Interior Building Surfaces Contaminated by Methamphetamine: Methods Development.

Karen R. Caldwell, PhD, Department of Chemistry & Physical Sciences

Current students – Amanda Apicella, ’18 & Jenna Martino, ’18

Colored compounds are applied to painted surfaces, recovered & then analyzed spectroscopically.



The overall goal is to determine the surface chemistry underlying effective remediation of clandestine methamphetamine labs.

To produce new formulations for remediation.

Ultimately, to reduce cost to property owners for remediation.

To develop methods for reproducible deposition & recovery of various model compounds on typical semi-porous interior building surfaces, *e.g.* painted board, hardwood floors, vinyl flooring.

To determine factors which are responsible for effectiveness of cleansers of these surfaces.

Chemistry of Silicone Materials for Hydrophobic, Anti-Bacterial, and High-Fidelity Surfaces

Krumpfer Research Group (L-R)
Dymin Morillo ('17),
Paula Hernandez ('19),
Prof. Krumpfer,
William Bender ('19)
Kaleigh Ryan ('19)
Taylor Longenberger ('17),
Joshua Kreitler ('18) (not pictured)

Silicone Surfaces and Materials

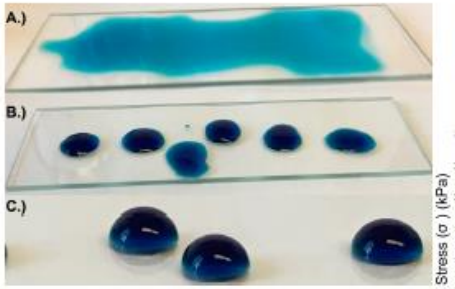
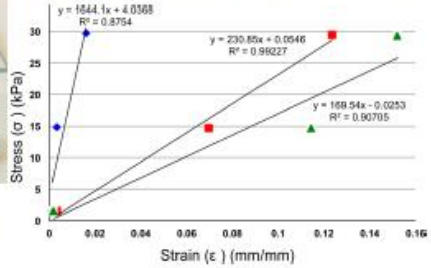
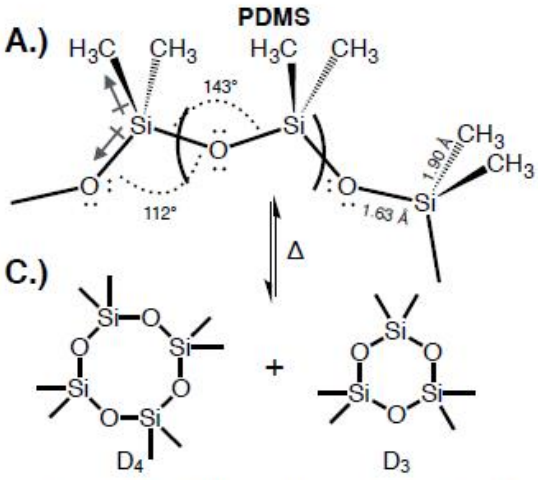


Figure 2. Water droplets on (A) a clean glass microscope slide, (B) a microscope slide that was made "dirty" by being rubbed with a gloved finger, and (C) a PDMS-treated microscope slide.





Siloxanes have remarkable properties which make them useful materials for a wide-variety of applications

High Thermal Stability
Wide Service Temperature Range
High Dielectric Strength
High Compressibility
Low Flammability
Non-toxicity
High gas permeability
High shear strength

- Hydrophobization of inorganic surfaces via vapor phase reactions
- Modification of silicone materials to prepare anti-bacterial medical devices
- High-Fidelity Replication of interfaces for pre-ceramic materials

1.) Longenberger, T.B., Ryan, K.M., Bender, W.Y., Krumpfer, A-K., Krumpfer, J.W., "The art of silicones: bringing siloxane chemistry to the undergraduate curriculum," *J. Chem. Educ.*, **2017**, DOI: 10.1021/acs.jchemed.6b00769.

2.) Ryan, K.M., Krumpfer, J.W., "Covalent attachment of 'reactive' cyclic siloxane vapor at metal oxide surfaces via ring-opening polymerization," in preparation.

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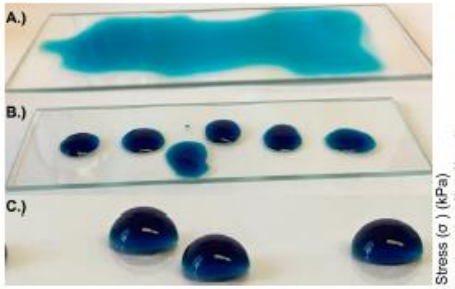
Silicone Surfaces and Materials



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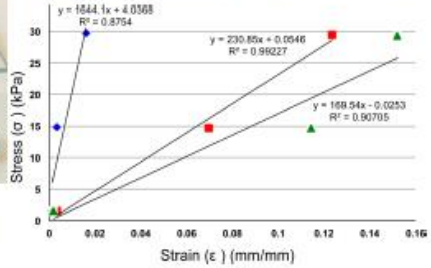

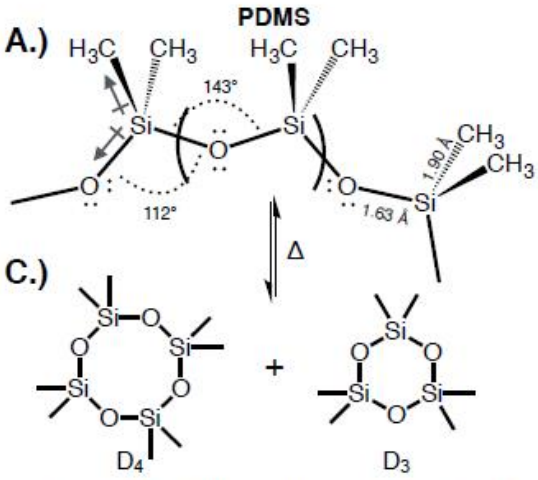

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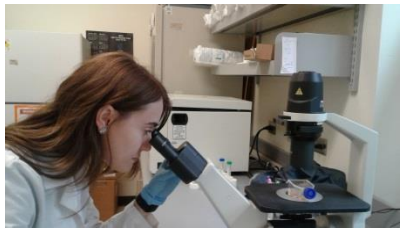
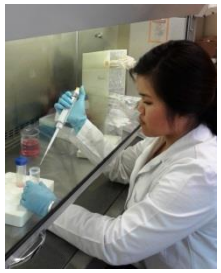
Novel activators of antioxidant and antihypoxic genetic programs

Students:

Olya Besedina (left) & Linh Nguyen (right)





PIs: Dr Ellen Weiser & Dr Irina Gazaryan

URS NY ACS meeting awards

Fordham University, May 2017

Goals:

One of the new trends in drug development is drug repurposing. Development of novel activators of antihypoxic and antioxidant genetic pathways is performed using the cell as a bioreactor for monitoring the turn-on of the corresponding genetic program.

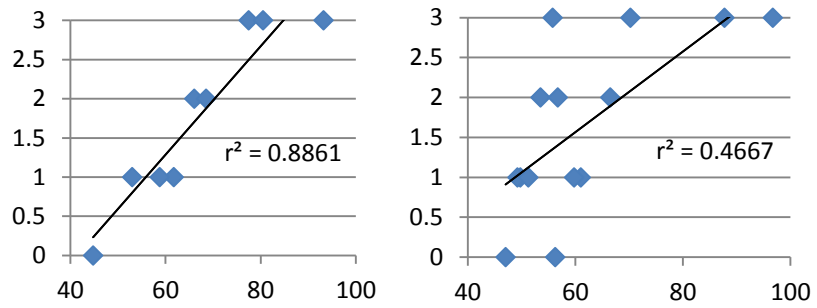
Our new findings are that tamoxifen, and beta-lapachone (an anticancer drug in clinical trials) are in fact direct activators of the genetically encoded antioxidant program.

- ## Specific Research Aims

The novel generation of cell-based reporters, the so called luciferase fusion reporters, HIF ODD-luc and Neh2-luc, available in the laboratory, open the possibility to screen for novel activators of HIF (hypoxia inducible factor) and Nrf2 transcription factors - two major transcription factors triggering the cellular antihypoxic and antioxidant response, respectively. Project #1: antioxidant and antihypoxic properties of metals; Project #2: small molecule activators targeting both genetic pathways.

Virtualization and Implementation of Spectroscopy in Undergraduate Chemistry Laboratory and Research Courses

Karen R. Caldwell, PhD **Joseph W. Krumpfer, PhD**



NMR quiz scores as function of Organic Chemistry II midterm exam average. *Left:* Class without iPads. *Right:* Class with iPads, where four students scored much better than peers in the control group, *i.e.* students with exam ave. of ca. 50%-70%.

To enhance learning & long term retention of NMR spectroscopy using the OrangeNMR app on iPads.

Supported by an Innovative Teaching Grant from the Provost's Office, AY 2016-17.

Thanks to our students in Organic Chemistry II & Advanced Inorganic Chemistry, Sp '17.

Specific Research Aims

- To engage students with an "Active Learning" iPad app – OrangeNMR.
- To use the app to help reinforce students' understanding of this critical lecture & lab topic from year to year in the chemistry/biochemistry curriculum.
- To measure the improvement in student learning utilizing this technology.