Online Proceedings

Poster Session 1

MGH 241, Easel 145

11:00 AM to 1:00 PM

Bisphosphorylimides as Organocatalysts for Asymmetric Friedel–Crafts Reactions

Omar Apolinar, Junior, Biochemistry, Calif St University San Marcos

McNair Scholar

Mentor: Robert Iafe, California State University San Marcos

With a society that consumes pharmaceuticals daily, the need to develop more efficient syntheses of bioactive molecules is vital. Organocatalysis is a field in chemistry that has been looked upon to have immense potential to succeed in this area. A type of organocatalyst that has been gaining notoriety is the bisphosphorylimide, which is a stronger acid and more sterically hindered than chiral BINOL-derived phosphoric acids. This upsurge can be attributed to the simple preparation and functionalization of bisphosphorylimides. In this investigation, several bisphosphorylimide organocatalysts are prepared and their performance in a Friedel-Crafts reaction between sesamol and benzylidenecarbamates will be presented. Ultimately, the enantioselective products synthesized from this research may serve as bioactive components in the preparation of pharmaceuticals such as trabectedin, an anti-tumor drug.

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MGH 241, Easel 146

11:00 AM to 1:00 PM

Wright Stain and Fluorescence-Based Methods in *Tetrahymena thermophila* for Phenotypic Analysis

Maria (Rosario) del Rosario Ramirez Mata, Junior, Medical Laboratory Sciences, Heritage College

McNair Scholar

Mentor: Robert Kao, Heritage University

In educational and research settings, *Tetrahymena thermophila* is a fresh water protozoan that serve as an excellent model organism for elucidating phagocytosis and ciliary motion. As a step towards determining how *Tetrahymena thermophila* adapt to environmental changes, we developed new, practical, inexpensive approaches that label organelle changes in fixed and living cells. To address our research objective, we pursued the following experimental approaches: One, a novel heat fixation method was used to fix *Tetrahymena thermophila* prior to doing a Wright stain and different conditions of Wright stain were performed and observed with a light compound microscope; two, to observe cells that have loss of plasma membrane integrity, we pre-incubated 20μM of Sytox green dye for three hours and observed for green fluorescence in the macronucleus (MAC) and micronucleus (MIC). We used a new portable battery-operated inverted fluorescence microscope designed by Dr. Rebecca Richards-Kortum's research group and Cellcams for acquiring images and time-lapse movies. We found that heat fixed *Tetrahymena thermophila* followed by a Wright stain labeled organelles at different stages of their life cycle. We conclude that using Wright stain and Sytox green fluorescence dye in combination with heat fixation are novel low-cost applications that allow phenotypic analysis in *Tetrahymena thermophila*. In the future, these useful approaches can be applied broadly into many lab inquiry settings, such as toxicology and molecular genetics.

Poster Session 1

MGH 241, Easel 127

11:00 AM to 1:00 PM

The Use of Feature Selection in Determining the Relationship between Chemical Composition and Sensory Properties of Hop Oil Extracts

Kimberly Claire Hoover, Senior, Chemistry (ACS Certified)

Mentor: Robert Synovec, Chemistry

Mentor: Kelsey Berrier, Department of Chemistry

This project seeks to relate chemical composition of hop oil extracts to their measured sensory qualities. Sensory properties of beer are the result of their unique chemical makeup fingerprint. Feature selection implemented in this analysis allows subtle differences in composition to be related to sensory profiles. Separation and content identification of the extracts was achieved with gas chromatography – mass spectrometry (GC-MS) instrumentation. Data pre-processing and analysis were completed using MATLAB software and peak finding algorithms developed exclusively by in-lab personnel. Feature selection strategies facilitated the comparison of individual analyte peak heights to sensory data. Several selection methodologies were tested to compare their utility in finding

correlations. These approaches included data tiling and peak table-based strategies. The mathematical nature of data correlation, linear or otherwise, was then investigated. Preliminary results suggest that there may be a complex relationship between the sensory profiles and chemical composition. Exploration in this research path will enable the use of data analysis methods developed herein to better determine which compounds present in food and drink contribute to unique sensory attributes.

POSTER SESSION 4

Commons East, Easel 54

4:00 PM to 6:00 PM

Ground Truthing Statistical Modeling in a Field Lab on the Damage Characteristics of Ice Targets by Projectile Hypervelocity Impact

Austin John Seely, Senior, Physics: Applied Physics
Mentor: Mariah Danner, Earth and Space Sciences
Mentor: Robert Winglee, Earth And Space Sciences

This project aims to ground truth a statistical model created previously by our lab. The model predicts the characteristics of a hyper velocity impact of a projectile into both sea ice and water ice. We compared the modeling program's simulated results with observed results from both 1.5 inch and 4 inch ice perpetrators on lab created water ice and naturally forming sea ice respectively and studying such characteristics such as peak ejection angle, maximum crater depth, and crater diameter. The experimental results are compared with the simulation presented by Koch 2017. We will apply both our experimental data and our simulation data in the design and creation of a two-stage penetration probe. The first stage is a hyper-velocity penetrator. The second stage is an aerobreaking probe that will use the plume created by the first stage to reduce its velocity before impacting the surface.

POSTER SESSION 4

Commons East, Easel 70

4:00 PM to 6:00 PM

HuskySat-1: a 3U CubeSat

Aaron Roy Adler, Senior, Physics: Applied Physics
NASA Space Grant Scholar
Mentor: Robert Winglee, Earth And Space Sciences
Mentor: Paige Northway, Earth and Space Sciences
Mentor: Paul Sturmer, Physics

Hosted through the Earth and Space Sciences department, HuskySat-1 is a 3U (30cm x 10cm x 10cm) satellite manifested for launch into low earth orbit in late 2018 or early 2019. HuskySat-1 is primarily an undergraduate research effort, but includes graduate students and industry partnerships. It spans many departments including Earth and Space Sciences, Electrical Engineering, Mechanical Engineering, Aerospace Engineering, Physics, Mathematics, and many others. The mission goals are to establish a space presence for the University of Washington, and to test novel hardware fabricated here at the University of Washington. Of particular interest are the Pulsed Plasma Thruster (PPT), a plasma propulsion device designed and fabricated entirely at the University of Washington in the Advanced Propulsion Labratory, and the K-band communication system, a high-frequency, high-gain antenna capable of transmitting data at megabits per second from orbit to Earth. The satellite also includes several other subsystems including power, attitude control, structures, computers and data handling, and low-gain communication. The mission strives to provide experience in real-life engineering to the entire team, and we achieve this by attempting to build as much of each of these subsystems from scratch as possible. Not only does this provide the most possible experience, but we are also able to grow our mission scope and customize our requirements without the excessive budget attached with many pre-made satellite components. We plan to present on the current and planned state of the mission, what we have learned in the process of designing and building this mission, and our next plans for further space exploration at the University of Washington.