

Abstracts from the 5th Annual LS AMP
S.T.E.M. Research Conference 2013

1. A Convenient One-Pot Synthesis of Ketones from Carboxylic acids using Palladium Catalysis

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Abstract

Acyl halides are reactive compounds that are used to synthesize several classes of organic compounds. They are generally prepared from the parent carboxylic acids using reagents such as phosphorous pentachloride or thionyl chloride, which are vigorous reagents that produce acidic by-products necessitating a difficult purification effort. The combination of triphenylphosphine and carbon tetrachloride ($\text{PPh}_3/\text{CCl}_4$) is a mild, neutral method for the preparation of acid chlorides. The goal of this research was to investigate a tandem reaction sequence incorporating acid chloride formation using $\text{PPh}_3/\text{CCl}_4$ with carbon-carbon bond formation using a Pd^0 catalyst and organostannane to form ketones.

2. Synthesis of Several 8-Hydroxyquinolate- based Ligands as Molecular Scaffolds for Metal-Organic Frameworks (MOFs)

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Abstract

Metal-Organic Frameworks (MOF's) consist of a coordination network of organic ligands made from the cross-linking of two or more individual chains in 1-, 2-, or 3-dimensions containing voids or pores. These pores can be useful in adsorption, separation, and storage of gases, such as hydrogen, helium, or argon and catalysis. MOF properties include high porosity and large internal surface areas. The Suzuki –Miyaura cross-coupling reaction which is a very efficient and rapid organic reaction of aryl- or vinyl-boronic acids has become of immense utility and is one of the most widely used methods in organic chemistry. However, little effort and focus has been put into MOF systems using this reaction. This study concentrated on Suzuki-catalyzed reactions between the boronic acids synthesized by palladium-catalyzed borylation of aryl bromides and a hydroxyquinoline ligand. The goal of this research was to synthesize new compounds, which can be used to complex to metals, forming compounds that crystallize as single-crystals for x-ray structural analysis. The conditions for this cross-coupling reaction to create ligands that will be used in MOF applications will be described.

3. A Convenient One-Pot Synthesis of Esters and Amides from Carboxylic Acids

Jennifer Rak, Unnati Shah, Shobika Sivaram, and Robert Aslanian, PhD

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Abstract

The highly reactive nature of acid chlorides distinguishes them as desirable reagents for a host of substitution reactions. However, many of the established methods for acid chloride preparation require vigorous reaction conditions and are limited by the formation of acidic material. As part of a broader project to investigate the formation of carbon-carbon bonds under neutral conditions from carboxylic acids, this initial study examined the use of triphenylphosphine and carbon tetrachloride to synthesize acid chlorides under mild and neutral reaction conditions and their *in situ* reaction with heteronucleophiles such as amines and alcohols.

4. Medical Geology: Urban Environmental Quality in Jersey City, NJ

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Abstract

Medical geology gives special emphasis to urban environmental settings; especially in light that the world's population increasingly resides in such areas. The primary aim of this project is to introduce the key concepts of medical geology to undergraduate research students while monitoring spatial and temporal variations of selected elements, including As, Cu, Fe, Mn, Pb, Ti and Zn, around the New Jersey City University campus. Major goals are to establish a database for future investigations, especially evaluating the impacts of extreme weather events, and to evaluate the surface environmental quality of the region by using the distribution and dispersion of heavy metal concentrations in urban soils. Chemical datasets obtained by using a portable-XRF are coupled with their particle size distributions. Samples collected pre- and post-Superstorm Sandy from the same urban settings (parks) revealed no statistically noticeable variation in heavy metal concentrations. However, urban soil samples collected from residential settings (backyards) displayed significantly higher levels of Pb concentration (1394 ± 670 ppm) compared to those from nearby urban parks (349 ± 146 ppm).

5. A Biological Assessment of the Arthur Kill Blueway Ecosystem: A Citizen Science Effort

Biology: Jorge Ruiz, Bill Surena, John Grew, PhD

Geoscience: Ousmane Kara, William Montgomery, PhD

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Abstract

Assigned at Future City Inc. (FCI), research was mainly focused on the Arthur Kill Blueway (strait), Marciante Park, the Marina, and the Veterans Memorial Park. Assessment of the waterfront's sustainability was the main focus of this research. Part of that assessment was

conducted through water probes. Additionally, identification of the present ecosystem and all its inhabitants was an ongoing aspect of this research project.

6. Android App Development for Health-data Input Management

Alannah Aceridano, Christopher Rapadas, Thomas Liu, PhD

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Abstract

Students worked on an Android app software that enables healthcare patients to download apps to their android-driven devices. This includes: android telephones, tablets, and computers. Patients will be able to enter their personal information and medical history onto those screens. Then, be able to submit that information to receiving clinician offices or hospitals that typically would require paper forms. This *Healthcare Input System* (HIS) helps to promote *Electronic Health Record* in health information management.

7. Victor Leon, Terry Kamps (PhD)

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Abstract

Worked on bioinformatics to characterize a cDNA library made from apomictic pistils of Buffelgrass. Research was also initiated for a project to characterize “Flowering on Time” which are genes that regulate the floral transition and are constitutively expressed in tobacco.