

2008 WNY ACS Undergraduate Research Symposium



**First Annual
Undergraduate Research Symposium**

Sponsored by the Western New York Section
of the American Chemical Society

and by

the Student Affiliates of the ACS, University at Buffalo Chapter

Saturday April 19, 2008

University at Buffalo, SUNY



University at Buffalo *The State University of New York*

Welcome Message from the Chair of WNY ACS Section

Welcome to the first Western New York American Chemical Society Undergraduate Research Symposium! Undergraduate research is vitally important to the future of our profession. Most chemists obtain their first experience in independent scientific research as undergraduates, and these years are formative! The Western region of New York is home to a number of excellent colleges and universities. It is the intention of this symposium to bring together undergraduate researchers from these different colleges to share their research experience. Over 20 posters and talks by undergraduate researchers will be presented along with a keynote address from Professor Paul Weiss, from Pennsylvania State University. Thank you for attending this symposium and sharing your research with us. We hope this will be the beginning of a long tradition of WNY ACS Undergraduate Research Symposia.

Sincerely,

Sherry R. Chemler, Ph.D.
Chair, Western New York American Chemical Society

2008 Symposium Organizing Committee

Chair: Dr. Sherry R. Chemler
Department of Chemistry, University at Buffalo, SUNY

Dr. Valerie A. Frerichs
Department of Chemistry, University at Buffalo, SUNY

Dr. Timothy M. Gregg
Department of Chemistry and Biochemistry, Canisius College

Benjamin A. Silverman
Department of Chemistry, University at Buffalo, SUNY

Schedule of Events

9:00-10:00 am	Registration / Poster setup / Breakfast
10:00-11:00 am	Student Oral Presentations
11:00-12:00 pm	Keynote Presentation by Dr. Paul Weiss, Department of Chemistry Pennsylvania State University "Exploring and Controlling the Atomic-Scale World"
12:00-1:00 pm	Lunch
1:00-2:00 pm	Student Poster Session I
2:00-3:00 pm	Student Poster Session II

Our Keynote Speaker

Dr. Paul S. Weiss is a Distinguished Professor of Chemistry and Physics at The Pennsylvania State University. Professor Weiss attended The Massachusetts Institute of Technology and obtained B.S. and M.S. degrees there. He worked with Professor Bob Field on high-resolution laser spectroscopy. He subsequently applied his interest in this area to graduate work at the University of California, Berkeley, where he worked with Professor Yuan T. Lee on excited atom reactions in crossed molecular beams. A postdoctoral appointment at AT&T Bell Laboratories studying the effects of surface chemistry and gas-surface collisions on semiconductor surface electronic properties with Mark Cardillo and a subsequent appointment as a visiting scientist at IBM Almaden Research Center where he helped develop and use low temperature scanning tunneling microscopy further prepared him for his academic appointment in the chemistry department of Pennsylvania State University in 1989, where he has been ever since.

Professor Weiss's research group is composed of over 20 graduate and undergraduate students as well as postdoctoral fellows. Their research is focused on gaining atom-scale control of materials properties. Using scanning tunneling microscopy, the Weiss group studies the principles behind nanometer scale electronics and storage. In a different program aimed at contributing to the biomedical field, the Weiss group studies membrane transport and cell adhesion at the molecular level.

Dr. Weiss has earned a number of awards in recognition of his outstanding research program, including the Sloan Fellowship, the Guggenheim Fellowship, and the National Science Foundation Presidential Young Investigator. Professor Weiss is currently the Editor in Chief of *ACS Nano*.

Oral Presentation Session

Room: NSC 215

Moderator: Dr. Sherry R. Chemler,
University at Buffalo, SUNY

Abstract	Time	Speaker:
WNY01	10:00 AM	Jeffrey D. St. Denis and Ronny Priefer Niagara University "Methoxyisopropylfurano[4,5:6,7] isoflavone; An antiproliferative isoflavone isolated from the species <i>Erythrina variegata</i> "
WNY02	10:30 AM	Jonathan Mann, Michael Gannon, Thomas Fitzgibbons , David Watson and Michael Detty University at Buffalo, SUNY "The sensitization of a TiO ₂ semiconductor with novel rhodamine dyes"
Keynote Address	11:00 AM	Paul Weiss Pennsylvania State University "Exploring and controlling the atomic-scale world"

WNY01

Methoxyisopropylfuran[4,5:6,7] isoflavone; An
antiproliferative isoflavone isolated from the species
Erythrina variegata

*Jeffrey D. St. Denis*and Ronny Priefer*

Department of Biochemistry, Chemistry and Physics, Niagara University, NY, 14109

ABSTRACT: Recently, novel secondary metabolites belonging to the family of compounds classified as isoflavones have been isolated from the flowering plant species *Erythrina variegata*. One of which, 5,4'-dihydroxy-8-(3,3-dimethylallyl)-2''-methoxyisopropylfuran[4,5:6,7] isoflavone, is the focus of interest within our lab. This compound contains a three fused ring system, which must be developed through numerous ring-closing procedures. The hallmark reaction in the 14-step synthesis of this anti-tumor isoflavone is an intramolecular McMurry coupling, developing the furan ring. To date, eight steps have been completed yielding the isoflavone skeleton while an example McMurry coupling has been achieved.

WNY02

The sensitization of a TiO₂ semiconductor with novel rhodamine dyes

Jonathan Mann, Michael Gannon, Thomas Fitzgibbons, David Watson and Michael Detty*

Department of Chemistry, University at Buffalo, SUNY. Buffalo, NY 14620

ABSTRACT: Electron injection into the conduction band of nanocrystalline titanium dioxide was achieved by using novel rhodamine dyes. Four rhodamine dyes were adsorbed onto anatase TiO₂. The electron transfer process was characterized by measuring incident photon-to-current efficiency (IPCE) and by emission quenching. The IPCE was measured by making a small solar cell with a TiO₂/rhodamine dye electrode and a platinum counter electrode. These novel rhodamine dyes form both J and H aggregates on the semiconductor surface, which broadens their absorbance spectra. Mixed layers of these dyes were also adsorbed to the semiconductor surface, which resulted in spectral broadening and increased light harvesting potential. Ground state oxidation potentials were measured with a standard calomel electrode, and excited state potentials were calculated by using emission and absorption spectroscopy. Based on the electrochemical and spectroscopic data, an electron injection mechanism has been proposed.

Student Poster Session I

Room: NSC 2nd Floor

Time: 1:00-2:00 PM

Abstracts

WNY03-WNY13

Student Poster Session II

Room: NSC 2nd Floor

Time: 2:00-3:00 PM

Abstracts

WNY14-WNY22

(it is our intention that poster presenters have ample opportunity to view the other posters and interact with their peers during these sessions)

Poster Session I Abstracts:

WNY03

Structural analysis of cantharidin analogs on HepG2 cell lines

Kyle R. Dunkle and Christopher S. Stoj*

Niagara University Department of Chemistry, Biochemistry and Physics,
Niagara University, NY 14109

ABSTRACT: Cantharidin has been utilized in ancient Asian cancer treatments for centuries. Recent studies have shown cantharidin to have inhibitory effects on several cancer lines including the liver carcinoma cell line HepG2. While somewhat effective, cantharidin is extremely toxic and has very low LD50 values. Our research focuses on testing several derivatives of the cantharidin molecule in attempts to show less cytotoxic effect while maintaining efficacy. In order to do this we have tested several analogs on the HepG2 liver carcinoma cell lines. Substitutions to the cantharidin base have occurred on the side chains as well as at the bridging carbon and have previously been synthesized in our labs. HepG2 cells were cultured in 96-well microtiter plates, treated with the cantharidin analog for 24 hours before being treated with a Promega MultiTox-Fluor Multiplex Cytotoxicity Assay. This assay was utilized to show sensitive measurement of both live and dead cells using fluorescence. Molecular modeling techniques were also utilized to show the molecules affinity to the active site.

WNY04

Fractionation of the Chelating Sensitizer cs124-DTPA

Matthew G. Frith, Ann M. Auberger and Luis A. Colón*

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ABSTRACT: There has been an interest in using sensitizing chelates in lanthanide enhanced fluorescence (LEF) due to their high solubility in water, large Stokes Shifts, and millisecond fluorescence lifetimes. Due to these properties, sensitizing chelates are being used as replacements for fluorescent dyes and radioactive tags. A lanthanide chelate contains a ligand that acts as an energy donor in LEF. One such sensitizer, 7-amino-4-methyl-2(1H)-quinolinone Diethylenetriaminepentaacetic acid (carbostyryl 124 -DTPA), was synthesized and purified using reverse-phase high performance liquid chromatography (RP-HPLC). Three fractions eluted from the HPLC and identified using mass spectrometry (MS); the first corresponded to cs124-DTPA and the other two corresponded to other byproducts of cs124-DTPA. Multiple injections into the HPLC system allowed the collection of cs124-DTPA; all the fractions containing cs124-DTPA were then pulled together for further studies. The isolated cs124-DTPA was then examined by absorption and fluorescence spectroscopy. Initial studies indicated the potential use of cs124-DTPA in LEF.

WNY05

PCB and PBDE levels in Large Mouth Bass (*Micropterus salmoides*) from Dunkirk Harbor and Black Rock Canal in Eastern Lake Erie

*Andrea Patterson**, Sara Lupton, Alicia Pérez-Fuentetaja, Mark Clapsadl and Diana Aga

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Department of Biology and Great Lakes Center, State University of New York College at Buffalo, Buffalo, NY 14063

ABSTRACT: Polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) are persistent organic pollutants and emerging environmental contaminants. They are classified as endocrine disrupters that interfere with production, release, transport, metabolism, binding, action, or elimination of the natural hormones in the body responsible for the maintenance of homeostasis and the regulation of developmental processes. Each chemical binds to soil and sediment leading to the uptake, bioaccumulation and biomagnification of these chemicals in organisms and the food web. These effects are observed in various fish populations of the Great Lakes, where vitellogen induction (feminization) in male fish has been a source of concern for fish species due to the effects on reproduction. Largemouth bass fall prey to predators such as steelhead and carp which in turn continues to concentrate these chemicals in food webs, moving from one trophic level to another. The higher up in trophic level that an organism is, the higher and more disruptive if not fatal, the concentration of the chemical can be. The indications of health effects on humans and the fate of these chemicals in the environment is also an area of concern. In identifying the presence of PCBs and PBDEs in male large mouth bass, fish tissue and plasma extraction methods were employed using Accelerated Solvent extraction (ASE) and liquid- liquid extraction respectively. Gas chromatography mass spectrometry (GC-MS) and Enzyme-linked immunosorbent assay (ELISA) were used for the detection of PCBs and PBDEs. Vitellogen analysis was completed using ELISA.

WNY06

Analysis of Wounded HaCaT Cells in Response to KGF and Hydrogel Membranes

Stephanie Beeman, Alan Champagne, Tanya Clapp, Kelsey Derricks, Linda M Wong,
Lynn Sigurdson and Robert Hard*

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ABSTRACT: The objective of this study was to investigate the response of wounded transformed human endothelial cells (HaCaT cells) and primary porcine oral epithelial cells (primary cells) to the exogenous addition of keratinocyte growth factor (KGF) and hydrogel membranes (hydrogel). Phase contrast microscopy and Axiovision imaging software were used to quantify wound healing and generate a series of KGF dose dependent response curves. Wound closure rates peaked with KGF concentrations at approximately 50ng/mL. Hydrogel sterilization was performed using Phosphate Buffer Saline with antibiotics (PBS), ethanol (EtOH), and ultraviolet (UV) radiation. No contamination was found on any of the three sterilization methods. Live/dead staining of seeded HaCaT cells showed minimal hydrogel cytotoxicity. Our data show that KGF-imbibed hydrogels provide a useful system for wound healing studies.

WNY07

The Synthesis of Transition Metal Doped Titanium Dioxide ($Ti_{1-x}M_xO_2$) Using Chemical Vapor Transport

Semeret T. Munie and Janet L. Hunting*

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ABSTRACT: Although most oxides are insulating, doping titanium dioxide with transition metals such as tungsten can produce a stable, conducting oxide. Traditional ceramic methods to produce these oxides can require very high temperatures. A more useful synthetic method is chemical transport via the vapor phase. The process uses a silica tube that contains the reactants sealed together with a transporting agent, under vacuum. The tube is placed inside a furnace and heated to high temperatures where the reaction of a reactant **A** with a transport agent **B** forms a volatile and unstable intermediate **AB** which subsequently decomposes giving **A** back. The conversion to gaseous phase makes solid state reactions possible by increasing the very slow rate of diffusion of solids dramatically. We were able to use chemical vapor transport method to synthesize transition metal doped titanium dioxide materials by using hexachlorobenzene, C_6Cl_6 , and ammonium chloride, NH_4Cl , as the transporting agents, thus $TiO_2 + 2Cl_{2(g)} \rightleftharpoons TiCl_{4(g)} + O_2$. The reactants were heated at 1100°C for 10 days then cooled to room temperature. Powder x-ray diffraction was used to confirm structure. The products were black in color and electrically conductive with a resistance lower than 1Ω.

WNY08

Investigation of the formation and structure of amine-terminated organic films on silicon substrates by Fourier-transform infrared spectroscopy and ellipsometry

Lai Sze Wan, Catherine Fill, Paul Seidler and Joonyeong Kim*

Department of Chemistry, Buffalo State College, 1300 Elmwood Ave., Buffalo, NY 14222

ABSTRACT: We present the formation and structure of amine-terminated organic layers on a silicon surface monitored by Fourier transform infrared spectroscopy (FTIR) with a grazing-angle attenuated total reflection (GATR) mode and ellipsometry. Amine-functionalized organic films were prepared by self-assembling 3-aminopropyltriethoxysilane (APTES) on silicon wafers in either anhydrous toluene or water for varied deposition times. FTIR and ellipsometry have shown that the structure and thickness of APTES films are governed by the deposition time and reaction solution. In both toluene and water, thicker APTES films were formed by increasing the deposition time. However, notable differences were observed in the film growth mechanism between these two solutions, resulting in the formation of structurally distinct APTES films. Deposition from an anhydrous toluene solution produces APTES films with a thickness ranging from 10 to 144 Å depending on the reaction time. Film growth proceeds by adsorption of APTES to the silicon surface followed by siloxane condensation, while APTES molecules at the outer layer are bound to the underlying APTES film via either covalent bond or noncovalent interactions. In an aqueous solution, a larger amount of APTES initially adsorbs to the silicon surface rather than from toluene at identical reaction times. However, most APTES molecules in films are loosely bound and are easily removed by sonication. FTIR spectra and ellipsometric thickness for APTES films were presented and compared in this presentation.

WNY09

Development of a Method for the Determination of Estrogenic Compounds

Charles Ian Rogers, Elmer-Rico E. Mojica and Diana S. Aga*

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ABSTRACT: Estrogenic compounds such as estrone (E1), 17- β -estradiol (E2), estriol (E3) and 17- α -ethynylestradiol (EE2) are introduced into the Great Lakes via discharges from wastewater treatment plants (WWTP). These estrogenic compounds have been found to trigger adverse biological effects in terms of normal endocrine function in aquatic organisms even at trace concentrations. It is therefore important to have an analytical method that is suitable to measure trace concentrations of these chemicals in surface water to be able to assess the potential of WWTP discharges on the ecological health of the aquatic environments. In this study, a method for the determination of estrogenic compounds using solid phase extraction (SPE) and liquid chromatography mass spectrometry (LC-MS) will be developed. The said method will then be used to determine the estrogenic compounds in samples from the Great Lakes and run-off samples from agricultural fields, which eventually gets into the lakes.

WNY10

Computational Modeling of Antimicrobial Quaternary Amine Salts for Structure-Activity-Relationship Studies

Mallory A. van Dongen, Mary McCourt and Ronny Priefer*

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ABSTRACT: The emergence of antibiotic resistant bacteria has led to a demand for new and more effective antibacterial compounds. Ammonium compounds have been known to have antibacterial capabilities. Varying the compound and its anions alters the system's antimicrobial activity. A recent study of antimicrobial compounds has led to a compilation of tetrabutylammonium salts with varying activities. The salts contain single charged anions differing in size and composition. In an attempt to determine the dependence of the salts' activities on their counteranions, the salts were modeled and studied both computationally and analytically. Modeling was performed using the SYBYL software on an HP1230. The anions were drawn with a methyl group attached to the most likely site of the negative charge and the tetrabutylammonium modeled as is. The MOPAC interfaces for each were calculated separately to obtain initial conditions of compounds. The molecules were then moved as close as determined feasible by van der Waals surfaces and merged. The MOPAC interfaces were then calculated for the new compound to observe the effect of interaction between the ions on partial charges of atoms. These values, in addition to the minimum possible distance between the charges, anionic size and structure, and ionic strengths were analyzed for correlation with antibacterial activity.

WNY11

Multistep synthesis of chalcogenoxanthenes and chalcogenoxanthylum dyes for use in the inhibition of P-glycoprotein

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ABSTRACT: Multidrug resistance (MDR) in cancer cells is a major problem caused by efflux pumps transporting drugs out of the cell. One such pump is P-glycoprotein (PGP); a transport protein. To combat MDR, xanthylum dyes can be used which have a high affinity for PGP. In binding to PGP, they mimic the chemotherapeutic drugs and can be transported in place of them. Xanthylum dyes are also photosensitizers which, if irradiated, could inhibit PGP by generating singlet oxygen. Making chalcogenoxanthenes, the base structure for chalcogenoxanthylum dyes, is a multistep synthesis involving: a Grignard reaction to yield diselenide (38.68%) and ditelluride (42.6%), the synthesis of a thioamide (95.5%) using piperidine and 9-Formyljulolidine, oxidation of the thioamide to yield an amide (72.4%), ortholithiation of the amide with a dichalcogenide and cyclization to yield selenoxanthone (61.1%) and telluroxanthone.

WNY12

Ethyl-Violet Dye as a Tool to Study Diffusion Rate of Acid and Base in Sol-Gel Matrix

Kazushige Yokoyama, Liwen Chen and Duo Duo Chen*

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ABSTRACT: Ethyl-violet dye exhibits a color change according to the pH condition and was used to investigate the diffusion process of acid and base inside a silica-based sol-gel matrix. The ethyl violet was encapsulated in a silica sol gel sample, and the buffer was added to monitor the change of the color. As the buffer solution penetrates into the location of the dye, the color became violet under basic condition and light blue under an acidic condition. This color change was monitored by absorption spectroscopy. Quite interestingly, the pH dependence color change was found to be a reversible process. From this study, acid and base diffusion rate in sol-gel matrix was extracted.

WNY15

Development of micelle models using co-solubility studies from DSC measurements and molecular modeling

*Megan Keeter*¹, Mary McCourt^{1,2} and Lawrence Mielnicki²*

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² MMC Lipid Bioservices, Inc, 102 DePaul Hall, Niagara University, NY 14109

ABSTRACT: This study uses physical chemistry techniques to develop models for making micelles. These micelles are then used as nanoscale directed drug delivery vehicles called cholestosomes. These cholestosomes carry drugs into cells and can be used to deliver to tumors. The ability to cross the blood brain barrier and bring drugs to the brain is a key advantage to these vehicles. The study uses cholesteryl dodecanoate, or commonly called laurate, and cholesteryl myristate as a model system. These two components are being used as a result of published X-Ray structural work, which indicated packing arrangements, as well as Differential Scanning Calorimeter, DSC, studies that showed co-solubility over a specified concentration range. The DSC provided phase data that can be used to model co-solubility diagrams. Co-solubility of these cholesteryl esters is determined by several factors including tail length and the degree of unsaturation in the tail of the components in the binary system. Proof of principle experiments for cholestosome production and delivery have been carried out. This experimental data was then used to create a model of this micelle structure using SYBYL.

WNY16

Preparation and Characterization of Mixed Monolayers on the Surfaces of Nanocrystalline TiO₂ Films

David A. Marsh, Jonathan R. Mann, Gregory R. Soja and David F. Watson*

Department of Chemistry, University at Buffalo, SUNY, Buffalo, NY, 14260

ABSTRACT: The properties and reactivity of mixed monolayer-functionalized surfaces are, in principle, widely tunable by varying the functional groups of surfactants. This presentation will focus on mixed monolayers on TiO₂ surfaces. We have found that mixed monolayers of mercaptoalkanoic acids (MAAs) and alkanolic acids (AAs) on TiO₂ surfaces undergo time-dependent compositional changes following the initial coadsorption process. The compositional changes are caused by the “chelate effect,” or an increase of the surface adduct formation constant (K_{ad}) of dimeric MAAs relative to monomeric AAs. This presentation will highlight the influence of the surface-attachment mode on the mixed monolayer formation process. Mixed monolayers of alkylphosphonic acids (APAs) and MAAs on TiO₂ surfaces were prepared, and their compositions were determined by vibrational spectroscopy. A mechanism will be presented in which the nature and strength of the surface-attachment interaction determines the composition, and therefore the terminal functionalization and reactivity, of the mixed monolayers.

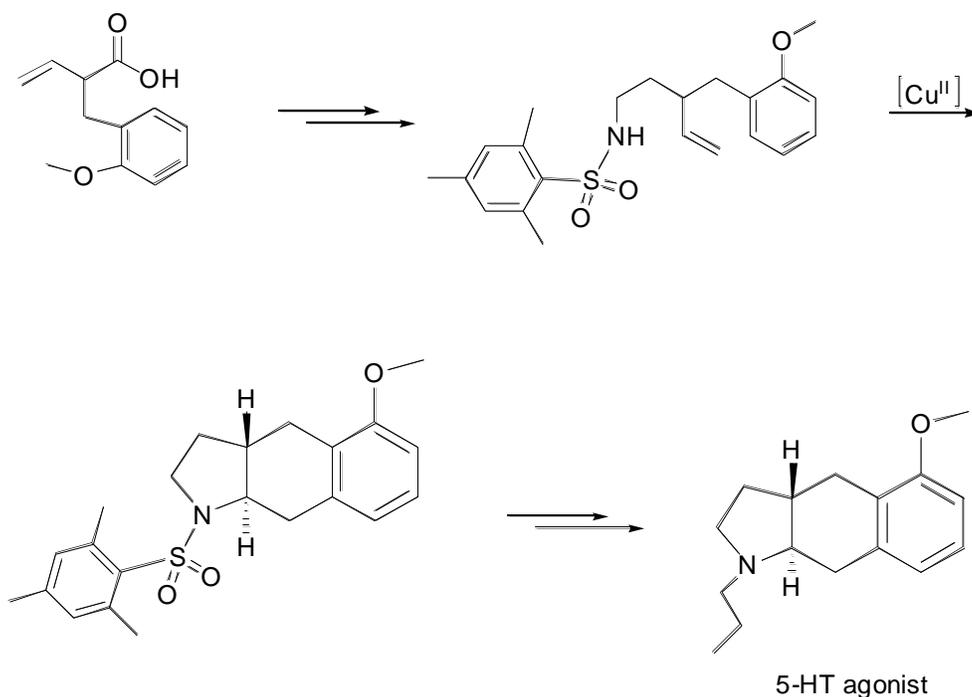
WNY17

Asymmetric carboamination for 5-HT agonist

Phung P. Tang* and Sherry R. Chemler

Department of Chemistry, University at Buffalo, SUNY, Buffalo, NY 14260

ABSTRACT: Nitrogen heterocycles are ubiquitous in natural products, and making these heterocycles can be quite a challenge. Previously published by the Chemler group, it was illustrated that the methodology for carboamination was possible, making two new rings via a net addition of an amine and aryl ring across an alkene, forming a nitrogen-carbon and carbon-carbon bonds via a copper(II)-promoted synthesis^{1,2}. Serotonin and dopamine are major neurotransmitters which have interested many studies. Structure-activity relationship work has been done on the 5-hydroxytryptamine analogs by Lin and co-workers³. We will use the carboamination reaction to synthesize a 5-HT agonist in 7 steps starting from vinyl acetic acid and 2-methoxybenzyl chloride.



¹ Sherman, E.S., Fuller, P.H., Kasi, D., Chemler, S.R. *J. Org. Chem.* **2007**, 72, 3896-3905.

² Manzoni, M.R. Vicinal Difunctionalization of Olefins: Aminohalogenation and Carboamination for the Rapid Assembly of Nitrogen Heterocycles, Ph.D. Thesis, University at Buffalo, **2006**.

³ Lin, C.H. et al. *J. Med. Chem.* **1993**, 36, 1069-1083.

WNY18

The study of the interaction of amyloid- β with colloidal gold nano-particles' surface

N. Miravalle, D. Hower and K. Yokoyama*

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ABSTRACT: An understanding of the interactions between proteins and a metal surface is necessary for the development of a biocomposite device. Amyloid β protein, $A\beta$, which is involved in fibrillogenesis, a process involved with the neuropathic disorder Alzheimer's Disease was studied. The segments of the $A\beta$ polypeptide: $A\beta_{1-42}$, $A\beta_{1-40}$, $A\beta_{1-11}$, $A\beta_{12-28}$, and $A\beta_{32-35}$, were studied with 20nm colloidal gold nano-particles as pH was manipulated from 2 to 10. UV-Vis absorption spectroscopy was utilized to monitor the changing optical properties of the solutions over the pH range. Only $A\beta_{1-40}$ solution showed a reversible color change from blue to pink as pH was manipulated between 4 and 10, respectively. The reversibility of this color change step is significant, as it corresponds to the reversible fibrillogenesis of $A\beta$.

WNY19

Quantification of the fraction of surface-adsorbed thiols involved in a nanomaterials assembly process

Jonathan Barone, Jonathan Mann, Gregory Soja and David Watson*

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ABSTRACT: Our research focuses on the attachment of inorganic nanoparticles to monolayer-functionalized surfaces. In an effort to demonstrate selective nanomaterials assembly, CdSe quantum dots (QDs) were attached to TiO_2 surfaces via mercaptoalkanoic acid (MAA) linkers. These MAAs were bound to the surface as deprotonated carboxylates. The QDs were then attached to the terminal thiol group on the surface-adsorbed MAAs. This poster will highlight our efforts to quantify the overall efficiency of the assembly process. The S-H stretching absorbances were monitored by FTIR allowing for an accurate quantification of the fraction of surface-adsorbed thiols involved in the assembly process.

WNY20

Europium(III) 1,2-Hydroxypyridonate Complexes as Potential Agents for DNA/PNA Recognition

*Janet R. Morrow and Sean A. Nunez**

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ABSTRACT: The family of hydroxypyridinones (HOPOs) has received much attention in recent years for their medicinal application as ligands for lanthanide contrast agents. Their ability to bind both di- and tri-valent transition metal ions is attributed to significant charge delocalization within the six membered heterocycle and a zwitterionic aromatic resonance form at physiologic pH. We investigate a readily functionalized 1,2-HOPO as these HOPOs are generally more acidic than their 3,2 and 3,4 HOPO analogs affording them greater metal cation binding ability. We find the 1,2 HOPO to increase the luminescence of Eu(III) and report lifetime luminescence data to describe the coordination sphere of the lanthanide complexed to the 1,2 HOPO. The binding affinities of the ligand to Mg(II) and Eu(III) are also reported. Additionally, several synthetic strategies are investigated for incorporation of functionalities to aid in the selective recognition of various DNA and RNA structures.

WNY21

Photoactivated 1,3-dipolar Cycloaddition between 2,5-diaryltetrazole and substituted alkenes

Wen Jing Hu, Yizhong Wang and Qing Lin*

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ABSTRACT: We examined the bioorthogonality of this reaction for residue specific protein modification, we introduced the diphenyltetrazole moiety into the lysozyme by acylating its surface lysines with a water-soluble tetrazole succinimide. We identified an extremely mild photoactivation procedure through the use of a hand held UV lamp from UVP. Under this mild condition, the photoactivated 1,3-dipolar cycloaddition reaction showed excellent solvent compatibility, functional group tolerance, regioselectivity and yield. We developed a bioorthogonal, photoinducible 1,3-dipolar cycloaddition reaction that allows for rapid and highly selective modification of proteins carrying a diaryltetrazole group in the biological media. Thus, we have developed a robust, photoinducible 1,3-dipolar cycloaddition reaction for selective protein modification in the biological media. This reaction is extremely fast and tolerant of proteinaceous groups.

WNY22

Implementation of a research-based format in a Regents high school chemistry laboratory course

David J. Goldberger, Ashlee A. Dawson, James R. McIntosh, Donald Jacobs, Valerie A. Frerichs and Joseph A. Gardella, Jr.*

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ABSTRACT: Literature shows a proportional benefit in the amount of authentic research experiences to discipline-specific development, with an emphasis on student socialization and establishment of mentoring relationships. At the Seneca Vocational School in Buffalo, New York, less than 20% of students scored a 65 or better on the June 2002-04 Chemistry Regents Examinations. Starting in the fall of 2006 the school was reformatted and opened as The Math, Science and Technology Preparatory School at Seneca (Seneca MSTP). We have modified and are piloting a research-based chemistry laboratory learning format at Seneca MSTP that emphasizes socialization through mentoring. The program is based on the Center for Authentic Science Practice in Education model through a partnership with Purdue University. We have expanded the original model to include the statewide educational technology platform NYLearns, new materials adherent to Regents standards, modern instrumentation, and assessment. The new format of chemistry laboratory is relevant to experiments performed in the ‘real world,’ as opposed to the previously used expository, or “cookbook,” style laboratory. The goal for this setting is to promote student investment in their schoolwork, improving their understanding of the subject, increase performance on the Regents exam and, ultimately, attend college. In the past, mentoring has been inclusive of assisting students only. In this project the mentoring role has been amplified to mentors constructing and testing curricula delivery, collecting evaluation data and providing revisions for future program advancement. Undergraduate mentors are now present in the classroom/laboratory on a daily basis, documenting all new implementation and assessment results. As this is an ongoing project, results to date will be presented.