

Dr. Gregory Barding

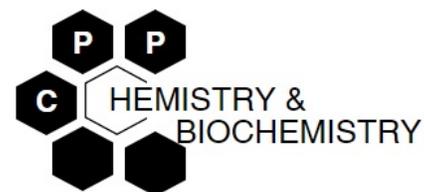


The Barding Lab is interested in elucidating the complex biochemical mechanisms responsible for organism survival by monitoring changes in metabolite levels (metabolite profiling) in the presence and absence of the stressors. By incorporating a variety of analytical techniques, including liquid and gas chromatography coupled with mass spectrometry, nuclear magnetic resonance, and UV/Vis spectroscopy, a broad representation of metabolites can be quantitatively measured, including TCA cycle intermediates, glycolysis intermediates, and amino acids. Understanding how metabolism and energy flux changes during the presence or absence of stress will aid in our understanding of the stress response of the organism. The Barding Lab is currently working on several projects related to metabolomics and organism stress, including biofuel production, crop production, soil toxicity, and probiotic-containing ruffage

Office: 8-310

Email: gabarding@cpp.edu

Phone: 909-869-3681



Dr. Timothy Corcoran

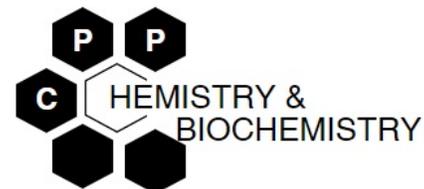


Our group plays with light in interesting and useful ways. We develop novel spectroscopic imaging techniques and instrumentation, mostly visible or near-infrared laser-based. Several projects are under way: 1) High-speed fluorescence spectroscopy for flowing capillary analysis of biomaterials with multiple fluorescent tags (Supercontinuum Rapid Excitation-Emission Matrix detection). 2) Raman imaging microscopy, finding the chemical fingerprints of surfaces. 3) Rapid, compact fluorescence confocal microscopy, aiming for 3D imaging of biological samples easily and cheaply. 4) Hyperspectral imaging (visible to near-infrared) for agricultural applications, helping farmers make best use their water. 5) Digital filter functions for immediate analysis of large spectroscopic data sets, such as hyperspectral or Raman imaging or in combined analytical techniques such as gas chromatography-mass spectrometry.

Office: 8-305

Email: tccorcoran@cpp.edu

Phone: 909-869-3672

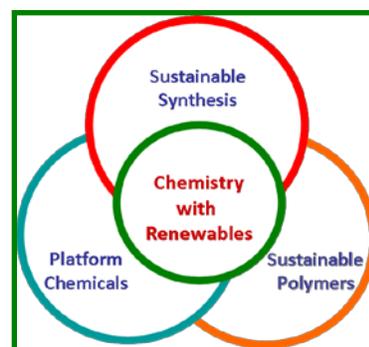


Dr. Alex John



Fossil resources have abundantly supplied for our energy, fuel, material and consumer needs etc. over the last century. Concern over its dwindling supplies together with environmental impacts from its exorbitant use has resulted in a global hunt for alternate sustainable resources. The scientific community has thus been faced with the challenge of identifying suitable substitutes or replacements for our current petrochemical feedstock. While solar, wind, fuel cells etc. can help us meet our energy needs of the future, biomass being the source of renewable carbon atoms could supply for our chemical feedstock. However, biomass and biomass-derived being structurally, compositionally and functionally different from petrochemicals demand the development of alternate methods for their efficient utilization. From a synthetic chemist's perspective this calls for a paradigm shift in how we think about our starting materials, reagents, catalysts, solvents and so on.

Keeping this in mind, my research program is directed towards efficiently incorporating biomass derived molecules in chemical processes. Research in the group scours different inter-related aspects like, (a) developing synthetic methods that use renewables, (b) converting bio-derived molecules into platform chemicals or feedstocks, and (c) developing sustainable plastics sourced from biomass. Our research group is developing methods for incorporating biomass-derived molecules in chemical processes. The first two projects involve developing efficient transition-metal catalyzed processes thus offering cost-minimization and waste reduction and hence, adhere to the principles of 'Green Chemistry'. Another frontier that is being explored is transforming platform chemicals obtained from biomass into value-added chemicals by engaging them in tandem reactions. I believe that research output from these projects will enhance our fundamental understanding of the reactivity of these bio-derived molecules, and thus open avenues for future research in this area.

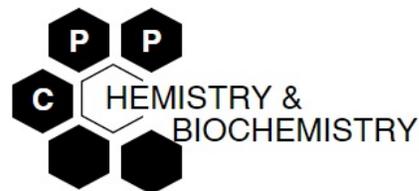


Our research group is developing methods for incorporating biomass-derived molecules in chemical processes. Research in the group scours different inter-related aspects like, (a) developing synthetic methods that use renewables, (b) converting bio-derived molecules into platform chemicals, and (c) developing sustainable plastics sourced from biomass. The first two projects involve developing efficient transition-metal catalyzed processes thus offering cost-minimization and waste reduction and hence, adhere to the principles of 'Green Chemistry'. Another frontier that is being explored is transforming platform chemicals obtained from biomass into value-added chemicals by engaging them in tandem reactions. Current projects along these lines are based on developing efficient molybdenum catalysts for effecting the deoxydehydration reaction, and using vanadium catalysts for oxidative lignin cleavage.

Office: 8-319

Email: ajohn@cpp.edu

Phone: 909-869-4309



Dr. Xiao-Chuann (Sean) Liu

Hemoglobin

(Hb) is the oxygen-transport protein and hemoglobin A1 (HbA1) is the most abundant hemoglobin component in human erythrocytes. Upon glycosylation, HbA1 will form glycated hemoglobin A1_c (HbA1_c) by a non-enzymatic glycosylation process. HbA1_c level indicates the mean glycemic control during the preceding 120 days. Diabetes Control and Complications Trial (DCCT) has established the relationship between HbA1_c level and the risks for development and progression of chronic complications of diabetes. One of my research interests is to investigate what other factors could affect the formation HbA1_c. For example, studies have indicated a higher concentration of HbA1_c in smokers as compared with nonsmokers. However the exact substance in the cigarette smoke responsible for this higher concentration of HbA1_c has not been investigated. Our study indicates that nicotine may be responsible for the elevated HbA1_c level in smokers with diabetes mellitus.

Another area of my research is to study various chemistry for quantifying HbA1_c. Measurement of HbA1_c is very important in the diagnosis and management of patients with diabetes mellitus. Clinical labs use a number of different analytical systems to determine A1c levels that include boronate affinity chromatography, ionic exchange chromatography, immunoassay, and enzymatic assay. Expensive instruments are employed in those assays. It is thus highly desirable to have a method that is fast, inexpensive and can be used at many different clinical sites as well as patients home.

The third area of my research is related to two-dimensional stationary phases for liquid chromatographic separations. The area of high performance liquid chromatography (HPLC) is an important field of research. One of the areas of great interest is the separation of biomolecules- proteins, nucleic acids, carbohydrates, etc. Currently, many bioseparations require several steps using different separation columns for an adequate isolation of the target biomolecules. This research was undertaken to create stationary phases that could be used in HPLC columns for separation of biomolecules. The incorporation of different functionalities into stationary phases will eliminate time-consuming steps for these isolations and improve efficiency. The stationary phases have a combination of functionalities that allow them to be used as two- dimensional material for bioseparation.

Office: 4/3-428

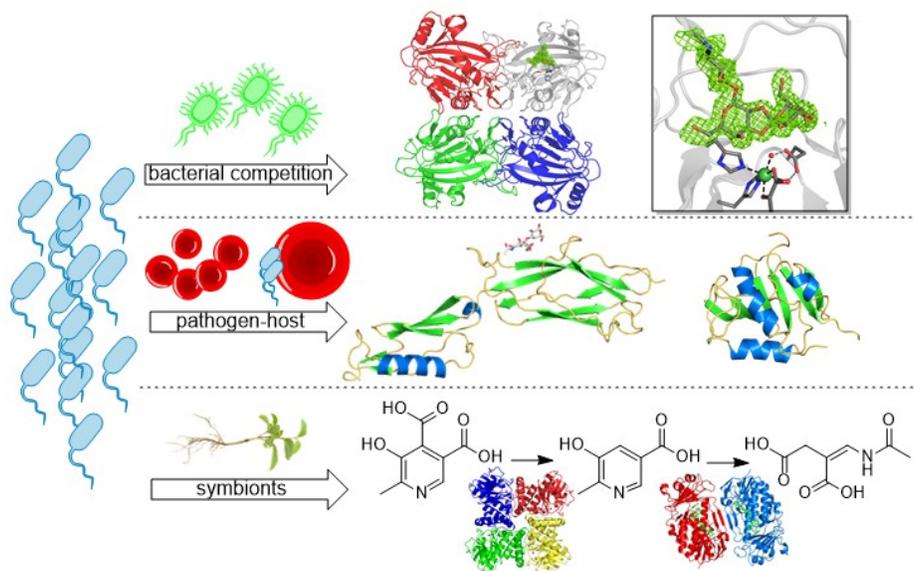
Email: xliu@cpp.edu

Phone: 909-869-3660

Dr. Kathryn McCulloch



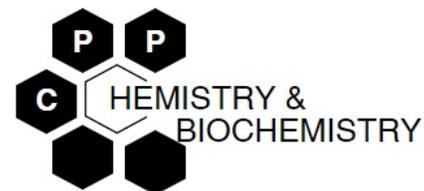
Organisms have not evolved in a vacuum – instead, they have interacted with their environment, competed for resources with other species, and collaborated with other organisms to thrive. These various forces have led to the evolution of complex pathways that produce signaling molecules, secondary metabolites, or otherwise provide the organism with an evolutionary advantage. To date, these pathways offer both the opportunity to develop new therapies, such as antibiotics, and offer potential targets for defeating pathogens or promoting human health. The McCulloch group aims to understand the chemistry of enzymes found within specific pathways. Currently, we are studying oxidoreductases (enzymes that catalyze either oxidations or reductions) encoded within the bile acid induced operon of some gut bacteria. We use a recombinant approach to overexpress each protein, and then use a combination of X-ray crystallography and *in vitro* biochemical assays to develop a molecular understanding of their structures and chemical reactivities.



Office: 4/3-429

Email: kmmculloch@cpp.edu

Phone: 909-869-4673



Dr. Rakesh Mogul

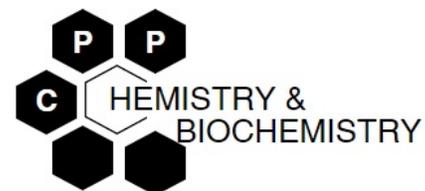


My laboratory conducts research in molecular microbiology, with a focus on the biochemistry of survival in extreme conditions. Our work focuses on the microorganisms and microbial communities found in the assembly facilities for spacecraft, ancient permafrost, and desert soils. Our overall aim is to understand and characterize the enzymes and metabolic features that support survival in these extreme environments. Specifically, we are interested in learning (a) how microorganisms survive in the cleanroom facilities where spacecraft are assembled, (b) how the biochemical signatures of life change over thousands of years in ancient arctic permafrost, and (c) how the biochemistry and microbial communities change during the early development of biological soil crusts. To conduct this research, we use a multi-disciplinary approach including microbiology, proteomics, metabolomics, protein purifications, enzyme assays, chemical kinetics, lanthanide chelation chemistry, and bioinformatics. Our projects are intrinsically structured around the work of undergraduate and Master's level students, and integrated into the educational fabric of the University through Senior Thesis, Master's Thesis, and Internship projects.

Office: 4/3-426

Email: rmogul@cpp.edu

Phone: 909-869-4309



Dr. Michael Page

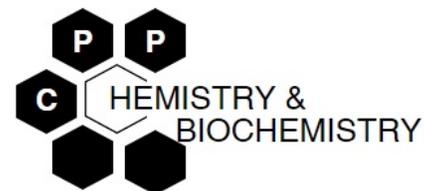


Research Dealing with Fatty Acid Methyl Esters (FAME) has a special niche at a polytechnic university. Alternative fuel research blends hands-on education with emerging technologies. Seed oils from plants consist of triglycerides that have demonstrated utility in the synthesis of Biodiesel. Value can be added to this budding industry by using organic chemistry to repurpose FAMEs as a feedstock in the synthesis of polymeric “Green” plastics and urethanes. Through our partnership with the USDA ARS, our goal to provide addition avenues for the use of biodiesel in consumer products in place of petroleum-based compounds.

Office: 8-317

Email: mfp@cpp.edu

Phone: 909-869-4533



Dr. Jodye Selco



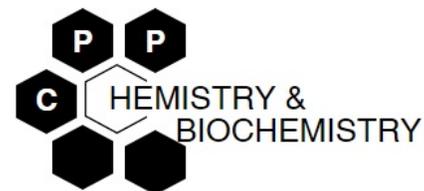
My research has been focused upon Chemical Education. We have been studying the effectiveness of instructional methods and curriculum on the learning success of students. I have been working with Rialto USD to develop "Common Laboratory" experiences for students at each grade. These experiments are aligned with the Next Generation Science Standards and all involve doing science to learn science. Now that these experiments are being used district-wide, we need to examine how well the students are learning from these experiences.

I have also been involved in Physical Chemistry research; as an experimentalist I have examined the spectroscopy, photochemistry, and kinetics of small organic molecules (e.g. pyridine). Most recently we investigated natural products as a source of compounds that could be used as sunblock

Office: 8-129

Email: jiselco@cpp.edu

Phone: 909-869-4552



Dr. Laurie Starkey

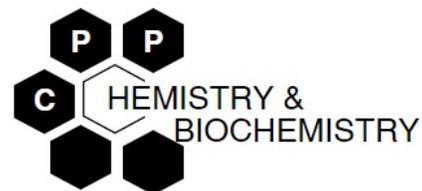


My research interests lie in the areas of both Chemical Education and Organic Synthesis. My main focus in Chem. Ed. Research is the utilization of technology in teaching and learning, especially in the Organic teaching labs. Recent activities include the creation of online pre-lab quizzes, online lab tutorials/demonstrations, and the use of “clickers” in the classroom (student response systems). Student research projects could involve the development of new online tools, or measuring the impact of such resources on student learning. My laboratory research projects involve the development and optimization of new experiments for the undergraduate Organic teaching labs. The goals of any new experiment include discovering interesting synthetic transformations and laboratory techniques, while being learning-centered, safe, time-efficient, cost-efficient, environmentally friendly (green), and inquiry-based.

Office: 4/1-428

Email: lsstarkey@cpp.edu

Phone: 909-869-3670



Dr. Chantal Stieber



The Stieber Lab focuses on solving problems related to small molecule activation through complementary efforts in synthetic inorganic chemistry, spectroscopy and computational chemistry. Current directions in the group include: 1) Expanding the scope of X-ray emission spectroscopy to allow for identification of small molecules (eg. NO, NO¹⁺, NO²⁺) bound to transition metal centers. Results of this work will be applied to understanding how biological systems reduce and capture airborne pollutants; 2) Synthesis of novel first-row transition metal complexes for benchmarking spectroscopic signatures of small molecules bound to metal centers; 3) Development of first row transition metal catalysts for transformations such as C-C bond formation and polymerizations; 4) Crystallography; 5) Multiplet calculations of f-block systems.

Office: 8-336

Email: sestieber@cpp.edu

Phone: 909-869-3674