

UC San Diego –National Sun Yat-sen University 2019 Bilateral Research Symposium

Welcome and Plenary Session

FRIDAY MARCH 8, 2019

**QUALCOMM AUDITORIUM
JACOBS HALL**

9:00 - 9:15 Registration

9:15 - 9:50 Welcome and Opening Remarks (Chairman, Robert Continetti, Senior AVC-Academic Affairs, UC San Diego)

- Welcome by Senior AVC-AA Robert Continetti
- Vice Chancellor for Research Sandra Brown (UC San Diego Opening Remarks)
- Vice President for Research and Development Mitch Ming-Chi Chou (National Sun Yat-sen University Opening Remarks)

10:00 - 11:45 Plenary Session (Chairman, Paul Yu, Interim Dean Graduate Division, UC San Diego)

- Kim Prather, Professor and Distinguished Chair in Atmospheric Chemistry, UC San Diego
“Overview of NSF Center for Aerosol Impacts on Chemistry of the Environment”
- Yi-jen Chiu, Professor, Department of Photonics, National Sun Yat-sen University
“Hybrid Thin-Film Si Photonics and Applications”
- Chih-Chuang Liaw, Professor and Chair of Marine Biotechnology and Resources Department, National Sun Yat-sen University
“Historical Perspective of Marine Natural Products in Taiwan”

11:45 - 11:55 Group Photo Session

ABSTRACTS

Overview of NSF Center for Aerosol Impacts on Chemistry of the Environment

Kim Prather

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The oceans cover nearly three-quarters of Earth's surface and produce vast quantities of sea spray aerosols (SSA). SSA particles are commonly assumed to contain mostly inorganic salts, however an increasing number of studies report that SSA particles can be enriched in a wide array of biological species including proteins, lipids, viruses, and bacteria. Field studies attempting to characterize the transfer of organic and biological species from the ocean to the atmosphere are hindered by interferences from the various sources and processes that occur in the marine atmosphere. In the NSF Center for Aerosol Impacts on Chemistry of the Environment (CAICE), we have created a unique facility that replicates the complexity of the real-world ocean-atmosphere system in the laboratory. In this facility, we are able to create and isolate nascent SSA emitted during phytoplankton bloom mesocosms. This presentation will discuss the sea-to-air transfer of biologically-derived organic matter which includes selective transfer of microbes, as well as diverse microbial enzymes (protease, lipases, and alkaline phosphatase). A discussion will be presented showing the temporal behavior of different classes of organic species in SSA at different stages of the bloom and the factors contributing to these differences.

Hybrid Thin-Film Si Photonics and Applications

Yi-jen Chiu

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Silicon photonics has been emerging as one of the key technologies to bring photonics into integrated circuit (IC) for different applications. For example, the data interconnects between modules, or within a chip, can be promoted to higher levels of data density, while maintaining low power consumption and high data rate. For another example, using optical phase- or amplitude detection, the submicron optical-waveguide engineering through so-called CMOS-compatible processing has enabled several sensor photonic applications, such as gyroscope, bio-sensor, extending multi-functions of optical signal processing. However, the indirect bandgap of Si-related material intrinsically restricts the development of its photonic device. Functions of light generation, optical nonlinearity, or high birefringence, still are the technology bottleneck to endorse in Si photonics. Thin-film integration using different material structure then becomes one promising solution to enhance or enable the future function of photonic integration. This presentation will give an overview of thin-film photonic devices and the related photonic integration developed in the Si-photonic group of Department of Photonics in NSYSU. By developing different aspects, such as linear and nonlinear optical signal processing, SOI passive and active devices and photonic devices of various material systems (III-V, liquid crystal (LC), Ta₂O₅) using thin-film template have been developed. The recent results of hybrid material system will be discussed for future application and fundamental study, including SOI device for optical wavelength, polarization, and grating coupler, III-V bonded Si devices for layer coupling, Ta₂O₅ thin film nonlinear and linear properties for future low loss and light source generation, and LC device for display. Also, the integration between such chips or material will be proposed with the recent progress for some gyroscope sensor and broadband optical data transmission in our team.

Keywords: Thin Film; Optical Waveguide; Hybrid Integration; Si Photonics

Historical Perspective of Marine Natural Products in Taiwan

Chih-Chuang Liaw

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Marine natural products are one of most interesting research topics to have been investigated during the last five decades worldwide. They exhibit a wide variety of biological activities and biofunctions. Impressively, some of marine natural products and their derived analogues have been clinically used to treat human diseases. In Taiwan, the researches on marine natural products were initiated in 1980's since the Department of Marine Resources was established in National Sun Yat-sen University (NSYSU), Kaohsiung. Besides, Taiwan, as well as nearby islands such as Penghu islands and Dongsha Atoll, locates on the north part of Coral Triangle in Pacific Ocean. The biodiversity of corals attracted the pioneers in NSYSU on the researches of marine natural products of soft corals. Till now, the fundamental researches on the marine natural products of soft coral and other marine organisms have been established in Taiwan. Moreover, some of those marine natural products are further developed as wound healing and neuroprotective agents for commercial uses. In recent years, more recruits joined us to extend our researches in the field to marine microorganisms by cooperation with the global natural product social molecular networking (GNPS) in UCSD as the de-replication strategy. In the talk, I would like to introduce the past and the present marine natural products researches in Taiwan and to promote our researches by cooperation with UCSD.

Keywords: Marine natural products; Soft corals; Neuroprotective; Coral Triangle; GNPS