美東華人學術聯誼會

Chinese American Academic & Professional Society (CAAPS)
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Forum- Biomedical Technology and Healthy Life

Date and Time: **April 25, Saturday, 2~5:30PM**
Place: **TECO in NY** Conference Room.
1 East 42nd Street, New York, NY 10017

Welcome Remarks 2~2:15PM

Ambassador Lily L.W. Hsu 徐儷文大使（洽邀中）
Taipei Economic and Cultural Office in New York (**TECO in NY)**

Executive Director Jonathan Shieh 謝水龍博士, Science and Technology Division, TECO in Boston, MOST, Ministry of Science and Technology

Director. Min-Ling Yang 楊敏玲博士, Education Division, TECO in NY

Dr. Ping-Tsai Chung 鍾炳采董事長, Chairman of CAAPS.

Plenary Keynote Speeches:

2:15 ~ 3:15PM, Speaker 1: "**Sustainable water purification using biomass nanofibers**", Distinguished Prof. Benjamin S. Hsiao, 蕭守道教授 Stony Brook University

3:15~4:15PM, Speaker 2: "**Technologies for producing humanized mouse model**", Shisoching Gong, PhD, 龔少靜教授 Assistant Professor of Research in Neuroscience, Weill Cornell Medical College.

4:15 ~ 5:15PM, Speaker 3: "**Potentials and Challenges of Incorporating Technologies to Medicine**", Jenghwa Chang, Ph.D. 張正華教授 Associate Professor, Northwell Health and Donald and Barbara Zucker School of Medicine at Hofstra/Northwell.

Sustainable water purification using biomass nanofibers

Benjamin S. Hsiao 蕭守道教授
Chemistry Department
Stony Brook University

Nanoscale cellulose fibrous materials obtained from the chemical treatment of biomass are very effective agents for the removal of toxic species from water, including heavy metal ions. **Our team at Stony Brook University has developed a simple, inexpensive and environmentally friendly approach to preparing nanostructured cellulose fibers for water purification, based on a nitro-oxidation reaction carried out on biomasses of diverse origins.** There are three key advantages of the nitro-oxidation method. First, the method greatly reduces the consumption of chemicals, energy and water. Second, the processing effluent can be efficaciously neutralised to produce plant fertilisers. Third, the method is effective to extract nanostructured cellulose from underutilised raw biomass such as agriculture waste. **The resulting nanocellulose is proven to be an efficient water purification material (membrane or adsorbent) that can treat a wide range of water pollution problems. The demonstrated technology represents an innovative means to enhance the nexus of food, energy, and water systems, and has many far-reaching impacts to improve quality of life.**

Dr. Benjamin S. Hsiao 蕭守道教授 is a Distinguished Professor in Chemistry at Stony Brook University. He received his B.S. degree from National Taiwan University in 1980, Ph.D. from University of Connecticut, and post-doctorate training at University of Massachusetts. He joined DuPont Company as a staff scientist and spent 8 years in R&D before coming to Stony Brook University. He served as Chair of Chemistry Department and Vice President for Research at Stony Brook University. Currently, Hsiao is a Founding Co-Director of Innovative Global Energy Solutions Center, aiming to prototype 'sustainability for off-grid communities of tomorrow', using the Turkana Basin Institute in northern Kenya as a living laboratory. He is also the Founding Director of Center for Advanced Technology in Integrated Electric Energy Systems, with the mission to enhance the development and integration of advanced technologies for the nexus of food, energy and water.

Hsiao's current research interests are mainly focused on the development of sustainable nanomaterials from underutilized biomasses for water purification. https://www.hsiaoglobal.org/

He published over 519 peer-reviewed scientific papers, 50 reviews and chapters in books and encyclopedias, 228 conference proceedings, obtained 51 issued patents

(including 31 US patents) and 21 pending patent applications, and edited 2 books. He was elected as Fellow of American Association for the Advancement of Science (AAAS), Fellow of American Chemical Society, Fellow of American Physical Society, Fellow of Materials Research Society, Fellow of National Academy of Inventors, AAAS-Lemelson Invention Ambassador, Honorary Professor from University of Queensland in Australia, Chang-Jiang Scholar from Education Ministry of China, Co-operative Research Award from Division of Polymeric Materials Science and Engineering of American Chemical Society, NSF Special Creativity Award and DuPont Young Faculty Award.

Technologies for producing humanized mouse model

Shisoching Gong 龔少靜教授

Weill Cornell Medical College

Transgenic mice have been extensively used to study function of genes. Humanized mice are transgenic mice carrying functioning human genes, cells, tissues, and/or organs, and are commonly used as small animal models in biological and medical research that provide opportunities to better understand the mechanisms of diseases and develop therapeutics.

Traditional transgenic studies, using genomic DNA elements less than 20 kb, are often hampered by position effects. Human bacterial artificial chromosomes (BACs) harbor long fragments of human genomic DNA up to 300 kb in size that contains its own promoter, associated regulatory elements, an open reading frame that encodes the gene of interest and a polyadenylation signal. Large genomic inserts that are typically insulated from position effects are needed to ensure accurate, integration site-independent transgene expression *in vivo*, thus allowing physiological regulation of the transgene in a manner similar to that of the human chromosome. The use of BAC for functional study has been limited due to the lack of genetic engineering strategy. **The development of BAC engineering system in GENSAT project (http://www.gensat.org) has greatly facilitated the BAC transgenesis, and helped generate more than 13,000 transgenic mice for neuroscience, the gene expression analysis data of which were deposited into a NCBI database (http://www.gensat.org).**

Current genome-editing tools mainly include ZFN, TALEN and CRISPR/Cas9, which have been successfully applied to all species; particularly, the application of CRISPR/Cas9 has quickly swept through the entire biomedical field. CRISPR-Cas9 system has been engineered into an efficient genome editing tool that a single RNA could guide a Cas9 endonuclease to target and break DNA. While genome DNA was disrupted, organisms would activate the DNA repair mechanism that induce non-homologous end-joining or homology-directed repair. The CRISPR/Cas9 system has been used to edit genomes with (1) deletion, (2) insertion, (3) substitution and (4) chromosome rearrangements.

In the field of medical genomics, BAC transgenesis is a powerful tool for generation of humanized mice. The mutations associated with human diseases can be easily edited in

humanized mice by the CRISPR/Cas9 system to identify the important regions that control human gene function or expression. The combination of BAC transgenesis and the CRISPR/Cas9 system has been linked for recent medical genetic studies for human diseases. These mouse models can be used to further explore the underlying genetic mechanisms that are important for the manifestation of human diseases and will provide a platform to develop efficient therapeutic strategies for the treatment.

Dr. Shiaoching Gong 龔少靜教授 is interested in understanding the molecular basis of disease. She earned her Ph.D. at SUNY Downstate Medical Center in the Department of Biochemistry and completed her postdoctoral training in the Laboratory of Molecular Immunology at The Rockefeller University. She was then recruited to head the Molecular Biology Core for the NINDS-funded Gene Expression Nervous System Atlas (GENSAT) project housed at The Rockefeller University. Working with Dr. Nathaniel Heintz, she and her team generated over 13,000 transgenic founder mice over a period of 12 years. **Over 1000 of these transgenic lines were made available to the public via the Mutant Mouse Resource and Research Center. The impact that this project has made on the field of neuroscience and mouse genetics is evidenced by the 1177 published scientific studies that utilized GENSAT mice or or BACs: (http://www.gensat.org/gensat_papers_report.jsp).**

More recently, Shiaoching has generated humanized mouse models by combining the BAC engineering strategy with CRISPR/Cas9 genome editing system. The goal of this work was to create models that would allow human disease-related genes or non-coding regions to be studied functionally in the lab. **Her current research interest is to apply her expertise to generate innovative mouse and iPSC models to study molecular mechanisms of Alzheimer's disease and frontotemporal dementia.**

Potentials and Challenges of Incorporating Technologies to Medicine

Jenghwa Chang 張正華教授

Northwell Health and Donald and Barbara Zucker School of Medicine at Hofstra/Northwell

Modern medicine has become a complicated interdisciplinary science as it continuously integrates state-of-art technologies into patient care. In the past twenty years, electronic flat panel detectors have replaced screen film cassette for acquiring x-ray projection images, and medical-grade monitors have taken the place of conventional films for displaying medical images. High-end medical accelerators are standard equipments for accelerating electrons, protons or heavy ion particles to treat different types of cancers. Many radiation oncology/surgery departments are now equipped with their own MRI and CT-PET units, which in the past can only be found in the radiology department. Complicated computer networking technology has also been adopted to help integrate the large amount of imaging, biological and pathological data that have recently become available for diagnosis and theray.

Recently, automation and artificial intelligent (AI) are also gradually adopted into medicine. It has been reported that AI can detect cancers better than human doctors. In radiation oncology, computer algorithms have taken part of medical dosimetritsts' tasks to speed up the treatment planning process. Some machine QA and calibration procedures are being automated so that they can be performed after hours other than competing for the limited machine time during the day with other patient treatment/diagnostic activities. Virtual reality has also been tested in training surgeons and radiation oncologists to minimize potential mistakes.

Adopting modern technology also causes some complications in medicine. First, fear has arisen that AI will replace human in practicing medicine leading to job loss for some medical professionals. It has been debated that who owns the patient information when it is deposited in a cloud storage. Finally, availability of a large amount of patient data might lead to ethical concerns including racial biases, discrimination, data skewness, unlawful use of the data, and tension between improving health and generating profit.

Dr. Jenghwa Chang 張正華教授 (BS, MS, National Chiao-Tung University; PhD, Polytechnic University) Associate Professor of Radiation Medicine, Donald and Barbara Zucker School of Medicine at Hofstra/Northwell; Adjunct Associate Professor of Physics&Astronomy, Hofstra University. Dr. Chang is a medical physicist certified by the American Board of Radiology. He is currently a Senior Medical Physicist and the Director of Medical Physics Residency Program at the Department of Radiation Medicine, Northwell Health. **His major clinical responsibility is Gamma Knife stererotactic radiosurgery/radiogherapy.** Prior to his current position, Dr. Chang held faculty appointments at NewYork Presbyterian Hospital (2010-2016), NYU Langone Medical Center (2008-2009), and Memorial Sloan-Kettering Cancer Center (1997-2008). Dr. Chang is a site surveyor for ACR Radiation Oncology Practice Accreditation (ROPA) program and is a reviewer for multiple international journals. His research interest involves applying engineering and physics principles to medicine, particularly, in the fields of radiology and radiation oncology. **Dr. Chang was a pioneer in optical diffusion tomography for early detection of breast cancers. He has also implemented the cone-beam computed tomography on a medical linear accelerator to improve the treatment setup accuracy and critical organ avoidance for radiation oncology patients.** Dr. Chang is a member of IEEE, AAPM and ASTRO. **He is serving as President of Academic Affairs of Chinese American Academic and Professional Society (CAAPS) in 2020.**

Chinese American Academic & Professional Society (CAAPS) *www.caaps.us*
facebook: www.facebook.com/caaps.us *was established in 1976 in New York City. Over the years, CAAPS became one of the largest Chinese American academic organizations in the United States. Members are academics or professionals from all walks of life.*