NANOTECHNOLOGY & ADVANCED MATERIALS SYMPOSIUM

Advanced Biomaterials and Nanotechnologies in Drug Delivery

Date : **25 September 2015 (Friday)**

Time : **2:00pm – 5:00pm (Registration starts at 1:45pm)**

Venue : **Room S226 – 228, Hong Kong Convention & Exhibition Centre**

Admission : **FREE**

Registration : **ONLINE REGISTRATION at www.nami.org.hk**

Different formulation strategies for advanced delivery are not limited to pharmaceutical industries but also equally applicable to healthcare and medical device sectors when controlled release of active ingredients is the key element of the product feature.

In this Symposium, world-distinguished speakers and local experts in biomaterials and drug delivery will share with us their latest applied research in the field and also the use of nanotechnology to go beyond the limitations of traditional medicine for clinical care. Our keynote speaker is the world-renowned Professor Allan Hoffman at the University of Washington, Seattle. He is practically regarded as the "Father of Biomaterials" since the 60's and is highly regarded in both academia and industry. Professor Joan Zuo is fully recognized as a leader in her specialized drug delivery systems and Dr. Boris Tong is well-known for his nanofiber technology platforms.

Academics, business professionals and the industry leaders can grasp the latest drug delivery technologies and materials, exchange views and explore market opportunities in this event.

For enquiries, please contact Miss Sammi Chan at +852 3511 3436, email to sammichan@nami.org.hk or visit www.nami.org.hk.

Organizer:

納米及先進材料研發院有限公司
Nano and Advanced Materials Institute Limited

Co-organizers:

香港中文大學
The Chinese University of Hong Kong

香港中文大學醫學院
Faculty of Medicine
The Chinese University of Hong Kong

School of Pharmacy CUHK
Expanding the pharmaceutical universe, Creating opportunities for life

HONG KONG PHARMACEUTICAL MANUFACTURERS ASSOCIATION

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PROGRAM

2:00pm **Welcome Remarks**

Dr. Connie KWOK

Director of Research & Development (Bio and Healthcare)

Nano and Advanced Materials Institute Limited

2:15pm **KEYNOTE PRESENTATION:**

The Origins and Evolution of Nanocarrier Drug Delivery Systems into the Clinic

Professor Allan S. HOFFMAN

Professor Emeritus, Department of Bioengineering

University of Washington

2:55pm **Role of Alternative Route of Administration in Drug Delivery**

Professor Joan Zhong ZUO

Acting Director, Associate Director of Research and Graduate Affairs

School of Pharmacy, Faculty of Medicine

The Chinese University of Hong Kong

3:35pm **Tea Break / Product Showcase**

3:55pm **From Tiny Fibers in Lab to Huge Benefits in Society:**

NAMI's Nanofiber Technologies for Bio & Healthcare Applications

Dr. Boris TONG

Project Leader

Nano and Advanced Materials Institute Limited

4:35pm **Q&A**

The Origins and Evolution of Nanocarrier Drug Delivery Systems into the Clinic

Professor Allan S. HOFFMAN
Professor Emeritus, Department of Bioengineering
University of Washington

ABSTRACT

Nano-scale drug delivery systems (NDDS) are very special, because they are usually targeted to specific cells in specific tissues or organs. NDDS are also special because most of them are focused on cancer chemotherapy. The size scale of these NDDS ranges from a few nm up to several hundreds of nm. In recent years, the number of FDA-approved NDDS has grown significantly.

There are many different types of NDDS, and many of them may also be PEGylated (conjugated with PEG molecules). The different nanocarriers are listed below. Most of these systems are composed of water-soluble and hydrophilic synthetic polymers, although they may be combined with hydrophobic components. The liposome is a different kind of nanocarrier; it is a small aqueous vesicle enclosed by a lipid bilayer made of phospholipids.

Examples of Nanocarriers
Liposomes
PEGylated Liposomes
Polymer-drug Conjugates
PEGylated Drugs
Antibody-drug Conjugates
Polycation-nucleic Acid Complexes (Lipoplexes and Polyplexes)
PEGylated Lipoplexes and Polyplexes Polymeric Micelles
PEGylated Polymeric Micelles
Albumin-drug Nanoparticles
Drug NPs, Nanogels, Nanotubes Dendrimer-drug Nanoparticles
Polymersomes

A nanocarrier may be conjugated to a drug, (e.g. PEGylation) or it may be complexed ionically to a drug of the opposite charge, (e.g. polyplexes and lipoplexes) or it may physically entrap a drug (e.g. liposomes). It may also be biologically (“actively”) targeted to specific cells using monoclonal antibodies or peptide ligands, or physically (“passively”) targeted to tumors via leaky blood vessels (EPR effect). The molecular weight (or size) and biodegradability of the nanocarrier are both very important to its eventual clearance from the body after delivering the drug.

There are three key discoveries/developments that have helped to bring NDDS into the clinic. They are 1) PEGylation 2) active targeting and 3) passive targeting (EPR). The history of these technologies will be described, and this talk will continue as a review of the early history of the types of nanocarriers listed above.

Role of Alternative Route of Administration in Drug Delivery

Professor Joan Zhong ZUO
Acting Director, Associate Director of Research and Graduate Affairs
School of Pharmacy, Faculty of Medicine
The Chinese University of Hong Kong

ABSTRACT

As the most common and convenient route of drug administration, oral administration still has several disadvantages including potential enzyme degradation in the gastrointestinal tract, first-pass metabolism through liver resulting in low bioavailability and relatively slow onset of action. To overcome these, alternative routes of administration have been utilized to offer attractive therapeutic advantages for systemic drug delivery. During the past decade, our research group has been actively working on the novel sublingual and intranasal delivery systems for both known and novel drug molecules aiming to achieve rapid and target therapeutic effects. In this talk, we are going to share our two exemplary works on 1) Application of our pH_{max} theory to maximize the trans-membrane flux of drug molecules for the development of sublingual product with rapid enhanced absorption. 2) Application of intranasal delivery system for CNS targeting drug molecules to improve their efficacy and decrease the side effects.

From Tiny Fibers in Lab to Huge Benefits in Society: NAMI's Nanofiber Technologies for Bio & Healthcare Applications

Dr. Boris TONG
Project Leader
Nano and Advanced Materials Institute Limited

ABSTRACT

Research related to nanofiber technologies has been done over a decade while the practical use of nanofibers in bio & healthcare applications has not received considerable attention until recent years. This presentation aims to summarize the technological development of nanofibers at the Bio & Healthcare Sector of NAMI. It will begin with a review on different techniques and materials used for nanofiber fabrication. Industrialization of nanofibers and commercialization of nanofibrous products will then be discussed, followed by a forecast of opportunities and challenges. Based on the latest research advancement, NAMI has developed nanofibers having large surface area to volume ratio, small pore size, as well as unique physical, chemical and biological properties, resulting in cutting-edge technologies in filtration, fluid relocation, drug delivery and tissue engineering. In filtration, we have developed bacteria-killing and virus-trapping protective masks with high breathability. In delivery and tissue engineering, we have developed functional nanofibers capable of releasing active ingredients, resulting in next generation skin masks and dressings/scaffolds for effective skin penetration and wound management respectively. Collaborating with our industrial partners, NAMI has successfully turned our nanofiber technologies into marketable products, and the huge economical and healthcare benefits arising from those innovative products are just around the corner.