SANTF 2018 Conference

Education, Research and Economic Opportunities in Nanotechnology

Date: April 20, 2018
Venue: Denman – UC 2.01.28, UTSA

Program Schedule

7:30 – 8:15	**Registration and Continental Breakfast**
8:15 – 8:30 AM	**Welcoming Remarks and Program Overview**
	Program Overview: Madhavrao Govindaraju, Ph.D., SANTF, Department of Mechanical Engineering, UTSA
	Welcoming Remarks: David Akopian, Ph.D., Professor, Associate Dean of Research, College of Engineering, UTSA.
8:30 – 9:50 AM	***SESSION I:*** ***Overview of Nanotechnology education programs in University and Community Colleges***
	Session Chairs: Dr. John Grillo, Chair, Workforce Education, Northwest Vista College
	Dr. Randolph D. Glickman, Ph.D., Senderoff Professor of Vision Research and McCoy Professor of Ophthalmology, Department of Ophthalmology, University of Texas Health Science Center at San Antonio, San Antonio, Texas.
8:30 – 8:55 AM	Robert Ehrmann, Managing Director, Center for Nanotechnology Education & Utilization (CNEU), Pennsylvania Nanofabrication Manufacturing Technology (NMT) Partnership, NSF National Nanotechnology Applications and Career Knowledge (NACK) Network, Pennsylvania State University, Workforce Development: Careers and Educational Programs in Nanotechnology Related Fields"
8:55 – 9:20 AM	Jennifer Steele, Ph. D., Professor, Department of Physics and Astronomy, Trinity University, "Integrating nanotechnology into an undergraduate liberal arts curriculum – experiences from Trinity University"
9:20 – 9:45 AM	Bart Sheinberg, Founding Center Director of the West Houston Center for Science and Engineering "Research Experiences and Exploration in Materials Science (REEMS)"
9:50 – 10:15 AM	**Coffee Break**

10:15 – 12:00 PM	***SESSION II:*** ***RESEARCH PROGRAMS IN NANOTECHNOLOGY***
	Session Chairs: Vasiliki (Vicky) Zorbas Poenitzsch, Ph.D. Senior Research Scientist, Materials Engineering Department, Southwest Research Institute, San Antonio, TX. Kathryn (Katie) Mayer, Ph.D., Department of Physics and Astronomy, UTSA.
10:15 – 10:40 AM	XingGuo Cheng, Ph. D., Principal Scientist, Pharmaceuticals and Bioengineering Department of Southwest Research Institute (SwRI) "Using nanoparticles for scar reduction and vaccines"
10:40- 11:05 AM	Mahmoud Abdelwahed, Ph. D., Associate Professor, Chemical Engineering Department, University of Texas at San Antonio (UTSA) "Optical Devices based on Plasmonic Nanoparticles".
11:05 – 11:30 AM	Liang Tang, Ph. D., Associate Professor, Department of Biomedical Engineering, University of Texas at San Antonio (UTSA), "Nanoparticle ordered assembly to enable surface plasmon coupled fluorescence enhancement".

11.30 AM – 11.35 AM **Break**

11.35 – 12.50 PM	**SESSION III: F*UTURE DIRECTIONS IN NANOTECHNOLOGY AND ECONOMIC OPPORTUNITIES – A ROUND TABLE DISCUSSION***
Panel Moderator:	Walt Trybula, Ph.D., MBA, IEEE Fellow & SPIE Fellow, Director of Trybula Foundation, Adjunct Professor, Ingram School of Engineering, Texas State University, San Marcos, TX.

Panel Members:

James Oxley, Ph. D., Staff Scientist, SwRI
Dorothy Silbaugh, Ph. D., Process Engineer, TowerJazz
Robert Schramm, Ph. D., Process Engineer, TowerJazz
Robert Lyle Hood, Ph. D., Assistant Professor, Department of Mechanical Engineering, UTSA
Neal Guentzel, Tech and IP Management Specialist, Office of Commercialization and Innovation, UTSA

12.50 PM – 2.00 PM **Lunch and Poster Presentations**

2.00 PM **Award Presentations and Concluding Remarks**

Program Overview

8.30 – 9.50 AM ***SESSION I:***
Overview of Nanotechnology education programs in University and Community Colleges

8.30 – 8:55 AM

Robert K. (Bob) Ehrmann is the Managing Director at the Penn State Center for Nanotechnology Education and Utilization (CNEU). Mr. Ehrmann has over 23 years of experience in industry before he joined the PSU CNEU. Mr. Ehrmann worked for Corning, Inc. where he held multiple positions in engineering, product development as well as management positions in engineering, production and project management. Mr. Ehrmann earned a BS in Ceramic Engineering from Rutgers University as well as an MBA West Virginia University.

Title: "Workforce Development: Careers and Educational Programs in Nanotechnology Related Fields"

Abstract: The CNEU is the home of the Nanotechnology Applications and Career Knowledge (NACK) Support Center a National Science Foundation funded Advanced Technological Education National Center. The NACK Support Center has a national mission to provide nanotechnology workforce infrastructure and to facilitate the development of nanotechnology workforce education programs at community and technical colleges and universities across the nation. In addition to this national mission, PSU/CNEU through its 18 credit Nanofabrication Manufacturing Technology (NMT) capstone semester has provided nanotechnology workforce education to over 890 students, through a statewide education-industry partnership consisting of degree programs at post-secondary institutions across Pennsylvania.

8:55 – 9:20 AM

Dr. Jennifer Steele is a professor in the Department of Physics and Astronomy at Trinity University. Her research involves the plasmonics of nanostructured surfaces and their application to fluorescence enhancement.

Title: "Integrating nanotechnology into an undergraduate liberal arts curriculum – experiences from Trinity University"

Abstract: Since 2007 I have been integrating nanotechnology into our undergraduate curriculum at Trinity University. Two courses have been created: Introduction to Nanotechnology, a course aimed at non-science majors, and Nanofabrication, a course aimed at upper division STEM majors. I have also developed nanotechnology lab modules for our upper division physics labs. In support of this curriculum, the university acquired two teaching atomic force microscopes and a scanning electron microscope funded by a W. M. Keck Foundation Undergraduate Education Program grant supplemented with funds from Trinity's equipment funds. I will talk about the successes and failures of these endeavors.

9:20 – 9:45 AM Mr. Bart Sheinberg serves as the founding Center Director of the West Houston Center for Science and Engineering.

Title: "Research Experiences and Exploration in Materials Science (REEMS)"

Abstract: Since 2015 Houston Community College science and engineering bound students have participated in a unique materials science educational program, REEMS. This program was funded through the Division of Materials Research at National Science Foundation and has four objectives, each centered on providing new intellectual challenges and motivational experiences for these students.

1. Identification and recruitment of talented and motivated students into REEMS, using the "gleem-in-the-eye methodology"
2. Immerse HCC students into a series of concurrent activities that are aligned with a fast-paced introduction to materials science and materials engineering
3. Provide a program structure to assist REEMS students with identification of their academic majors and transfer universities
4. Through leveraging partnerships with university research faculty, professional societies and business, ensure that the program generates student enthusiasm over the entire course of their academic studies and into their professional careers.

This presentation will provide an overview of these four elements of the REEMS program and conclude an overview of evaluation methodologies and feedback from students on the impacts of this program and next steps for the REEMS program. REEMS was funded through the National Science Foundation, Division of Materials Research (14-60564).

10:15 – 12:00 AM ***SESSION II:***
RESEARCH PROGRAMS IN NANOTECHNOLOGY

10:15 – 10:40 AM Dr. XingGuo Cheng is a principal scientist in the Pharmaceuticals and Bioengineering Department of Southwest Research Institute. His research interests relevant to nanotechnology are: custom-made nanomaterials for drug/gene/vaccine delivery, nanoencapsulation of cells for treatment of various diseases, and cGMP manufacturing of nanomaterials.

Title: ***Custom-made liposome nanoparticles for scar reduction and vaccines applications***

Abstract: Liposomes are vesicles made from lipids, cholesterols, and other membrane molecules. Here we present custom-made liposome formulations which can load both hydrophobic drugs and 10 different peptides. In a rabbit ear

hypertrophic scar model, liposomal statin showed improved scar elevation index and improved skin wound healing. In a porcine H1N1 flu vaccine challenge model, liposomal vaccine protects the lung and nose via strong IgG immune response. Liposome encapsulated vaccine outperform non-encapsulated vaccine in terms of immune response, fever reduction, virus load. Our results clearly demonstrated the promising applications of custom-made liposome for scar reduction and flu vaccine applications.

10:40- 11:05 AM Dr. Mahmoud Abdelwahed is a professor in the department of Chemical Engineering at University of Texas at San Antonio. Prior to join UTSA, he was a Postdoctoral research scientist at Laser Dynamics Lab at Georgia Institute of Technology. His research involves the optical devices based on plasmonic nanoparticles.

Title: "Optical Devices based on Plasmonic Nanoparticles"

Abstract: Plasmonic nanoparticles-polymers hybrid materials are used in different optical (polarizers, filters, and light wavelength modulators) and sensing (optoelectrical and optomechanical) applications. Plasmonic nanomaterials of different designs and compositions are prepared by new chemical techniques at a large scale. The Langmuir-Blodgett technique is used to assemble colloidally prepared plasmonic nanoparticles of tailored designs and structures with controlled organization on different substrates.

11:05 – 11:30 AM Dr. Liang Tang, (UTSA) is an Associate Professor in the Department of Biomedical Engineering at UTSA. He holds a Ph.D. degree in Chemical Engineering from University of Louisville, USA in 2005. He finished his postdoctoral training in Biomedical Engineering/Cardiology at the Cedars-Sinai Medical Center, University of California at Los Angeles (UCLA) and Indiana University School of Medicine in 2008. Since then, Dr. Tang joined as a faculty in Biomedical Engineering Department at University of Texas at San Antonio, USA. His "Nanosensor and Nanomedicine" research laboratory is focused on the applications of various multi-functional nanoparticles (e.g., gold and magnetic NPs) in a wide spectrum of biomedical research from rapid medical diagnostics to gene therapy. The research projects are funded by federal agencies including National Institutes of Health (NIH).

Title: Nanoparticle ordered assembly to enable surface plasmon coupled

fluorescence enhancement

Abstract: Nanotechnology has dramatically impact the design and application of biosensing for molecular detection and clinical diagnostics. Gold nanoparticles exhibit strong surface plasmon resonance which is suitable to enhance the emission intensity of fluorophores. This requires precise fabrication of self-assembled monolayer of metallic structures to realize near-field metal enhanced fluorescence (MEF) effect. Nanoparticle assembly has emerged as an efficient approach for creating homogeneous areas of "hot spots" with desired surface plasmon pattern. Anisotropic gold nanorod (GNR) is ideal for orderly assembly in vertical array

fashion, where strong palsmonic enhancement is present among neighboring GNR tips. Herein, we demonstrate the process of controlled GNR array pattern. Simulation results showed significantly intensified plasmons at the tips of the GNR array surface. Fluorescence was then connected to GNR arrays via complementary DNA double strands with varying length. It was found that fluorescence intensity was increased up to 5~7 folds with gold film coating as compared to bare glass. The vertical GNR arrays yielded MEF effect, which was dictated by the spectral overlap between nanorod SPR wavelength and the excitation/emission wavelength of fluorophores. Specifically, the maximum enhancement of Quasar 670 was observed when it was coupled with GNR664 (plasmonic wavelength 664 nm) at a distance of 16 nm, while the FAM fluorescence was at maximal intensity when attached to gold nanosphere 520 nm. The fabrication of ordered GNR array with periodic pattern provides a new paradigm for plasmonic biochip development to enable fluorescence detection of multiple DNA sequences simultaneously at picomolar level with high-throughput capability.

KEY

FAB	Fan Amenities Building
TSS	Track and Soccer Stadium Building

UTSA Park West
8000 N. Loop 1604 West
San Antonio, Texas 78249

- BUILDING
- HOUSING
- PARKING GARAGE
- PARKING LOT
- WALKWAYS

- (B) BOOKSTORE
- BUS STOP
- (F) FOOD COURT
- (M) PAY METER
- (A) UNDERGRADUATE ADMISSIONS
- (i) VISITOR INFORMATION
- WELCOME CENTER

N W E S

UTSA Main Campus
One UTSA Circle, San Antonio, Texas 78249

REV 09/10/13

KEY

AC	Activity Center	G4
AET	Applied Engineering and Technology Building	M8
ART	Arts Building	N6
BOS	Bosque Street Building	K4
BSB	Biosciences Building	M7
BSE	Biotechnology Sciences and Engineering Building	M8
BB	Business Building	M4
BSA	Business Services Annex	E6
CAR	Center for Archaeological Research	D6
CRW	Central Receiving & Warehouse	D6
CDC	Child Development Center	F10
CC	Convocation Center	J7
EB	Engineering Building	M7
FSB	Facilities Services Building	D7
FLN	Flawn Sciences Building	M6
HUC	H-E-B University Center	K6
JPL	John Peace Library ▪ *Enrollment Services Office* ▪ *Financial Aid and Scholarships Office* ▪ *Fiscal Services* ▪ *Registrar*	M5
MB	Main Building ▪ *International Admissions*	N5
MBT	Margaret Batts Tobin Laboratories	D5
MEM	MEMS Lab	E6
MH	McKinney Humanities Building	L6
MS	Multidisciplinary Studies Building	L6
NPB	North Paseo Building	L4
PE	Physical Education Building	J6
PDS	Power & Dynamics Systems Lab	E5
PNB	Plaza Norte Building ▪ *Air Force ROTC* ▪ *Army ROTC* ▪ *The Graduate School*	K4
RRC	Roadrunner Café	H4
RWC	Recreation Wellness Center ▪ *Recreation Center* ▪ *Health Services*	I7
SCG	Sculpture & Ceramics Graduate Studio	E6
SEL	Science and Engineering Lab	E5
SRL	Science Research Laboratories	E5
TEP	Thermal Energy Plant	K5
UC	University Center North	K5