

Date: 18 June 2019

JSPS US ALUMNI ASSOCIATION SEMINAR PROGRAM
REPORT

Organizer (Awardee)

Name: Ranil Wickramasinghe

Position & Affiliation: Professor, Ross E Martin Chair in Emerging Technologies, Ralph E Martin

Department of Chemical Engineering, University of Arkansas

1. TITLE OF SEMINAR 2019 Advanced Membranes and Membrane Based Separation Processes Symposium
2. DATE(S) 15-17 May 2019
3. VENUE & CITY, STATE Inn and Carnall Hall. University of Arkansas Fayetteville Campus, Fayetteville, AR
4. TARGETED RESEARCH AREAS (1) Membrane Materials (2) Membrane processes (3) Membrane Applications
5. NUMBERS OF PARTICIPANTS TOTAL: <u>35</u> persons including <u>1</u> US Alumni Association members -US: <u>27</u> persons -FROM OVERSEAS: <u>8</u> person(s) including <u>1</u> person(s) from Japan

NOTES FOR REPORT

*Please be sure to include the following contents. (Maximum 5 pages)

Executive Summary

The symposium on Advanced Membranes and Membrane Based Separation Processes Symposium brought together leaders of membrane centers from around the world. Membranes and membrane-based separation

processes are growing in importance as membranes often offer more sustainable lower cost separation processes when compared to competing technologies. Today there are leading membrane centers around the world that are focused on developing new membrane and membrane processes for separation and purification of compounds in biopharmaceutical manufacturing processes to the chemical industry and water treatment to name a few areas. This symposium brought together for the first time the directors of some of the leading membrane center around the world specifically: Japan, Taiwan, China, South Africa and the USA. The presentations and discussions have led to the possibility of many new international collaborations.

The symposium was also used as a platform for a Memorandum of Understanding signing ceremony between the University of Arkansas the Research Center for Membrane and Film Technology, Kobe University. We expect to develop a strong collaboration with Kobe University. Prof Wickramasinghe and other faculty from the University will be attending the annual meeting of the Research Center for Membrane and Film Technology, Kobe University.



Prof Heather Nachtmann, Associate Dean for Research, College of Engineering, University of Arkansas and Prof Hideto Matsuyama, Director Center for Research and Film Technology, Kobe University signing MOU.



From Left to right: Prof David Ford, Head of the Department of Chemical Engineering, Prof Heather Nachtmann, Prof Hideto Matsuyama and Prof Ranil Wickramasinghe with signed MOU.

Topics Discussed with Outcomes & Future Challenges

The workshop focused on research activities at various membrane center around the world. Specifically, Prof Hideto Matsuyama discussed current research at the Center for Research and Film Technology, Kobe University. This is the only membrane center in Japan. It has a very large number of industrial sponsors and is conducting cutting edge research both in developing new membranes as well as membrane processes for industrial applications.

Prof Jianxin Li, Director of the National Center for International Joint Research on Membrane Science and Technology, Tianjin Polytechnic University and a member of the State Key Laboratory for Membrane Research discussed a new type of membrane application: an electrocatalytic membrane reactor for treatment of landfill leachate. The State key Laboratory for Membrane Research is the world's largest membrane research center. Prof Li also provided a brief introduction to the State Key Laboratory.

Prof Yung Chang, Director, Center for Excellence, Ministry of Education, R & D Center for Membrane Technology, Chung Yuan Christian University, Taiwan presented results on the development of zwitterionic membranes for medical applications. In particular, he presented result on a leukocyte filter based on his technology. The Center for Membrane Research at Chung Yuan University is the only membrane center in Taiwan. The center was formed around 2004. It has a long history of excellence in membrane science and technology. The Center not only

conducts fundamental research but also help local industry design and scale up processes for making new and novel membranes.

Prof Bhekia Mamba presented research results on the development of catalytic membranes. Prof Mamba is the Executive Dean of the College of Engineering, Science and Technology, University of South Africa (UNISA). UNISA has the largest program in membrane science and technology in South Africa and in fact in Africa. The membrane program is rapidly expanding with a focus on membranes and membrane processes for water treatment.

Prof Ranil Wickramasinghe described the Membrane Science, Engineering and Technology (MAST) Center. This is a 4 campus National Science Foundation Industry and University Cooperative Research Center. The Center is led by the University of Arkansas. The three partner institutions are the University of Colorado Boulder the New Jersey Institute of Technology and Penn State University. This is a very old membrane center that has its beginnings 1990. The Center had almost 25 industrial sponsors.

Additional presentations by faculty at the University of Arkansas were given by Prof David Ford, Head of the Department of Chemical Engineering; Prof Xianghong Qian from the Department of Biomedical Engineering and Prof Joshua Sakon from the Department of Chemistry and Biochemistry. Presentations given by other international speakers were Antoine Venault; Chung Yuan Christian University, Taiwan; Prof. Guy Ramon; Faculty of Civil and Environmental Engineering, Technion, Israel and Prof Kulyash Meiramkulova; Professor of Management and Engineering in the field of environmental protection of L.N. Gumilyov Eurasian National University.

The symposium was unique in that the directors from some of the world's leading membrane centers were able to exchange ideas and discuss possible collaborations. The additional presentations by other researchers helped provide a framework for possible research collaborations between centers.

The workshop included time for networking at the welcome dinner and workshop dinner as well as the lunch and coffee breaks. Tours of the facilities at the University of Arkansas were offered for the participants. Overall the workshop was highly successful. Not only were there high-quality research presentations in a number of areas of membrane science and technology, a roadmap for future collaborations was discussed. The MOU that was signed between Kobe University and the University of Arkansas will lead to the immediate development of collaborative research between these two institutions.



Seminar participants, Prof Wickramasinghe speaking



Group photo of seminar participants

Workshop Agenda

DATE/TIME	TITLE	SPEAKERS
Wednesday, May 15 8:00 p.m.-9:30 p.m.	Welcome reception; Sauced Restaurant, 540 W Dickson St, Fayetteville, AR 72701.	Presenters and any JSPS staff (restaurant has been booked for our private function)
Thursday, May 16 8:30 a.m.-9:00 a.m.	Welcome University of Arkansas administrators Inn at Carnall Hall 465 N Arkansas Avenue, Fayetteville, AR, 72701.	<u>Prof. Heather Nachtmann</u> ; Associate Dean for Research, College of Engineering, University of Arkansas, USA <u>Prof. David Ford</u> ; Department Head Chemical Engineering, University of Arkansas, USA MOU Signing Ceremony with Kobe University
9:00 a.m.-9:30 a.m.	JSPS international program information session	<u>Ms. Yuki Abe</u> ; JSPS Washington Office
9:30 a.m.-10:15 a.m.	Keynote Address: “Membrane Technology in Membrane Center at Kobe University”	<u>Prof. Hideto Matsuyama</u> ; Director, Center for Membrane and Film Technology, Department of Chemical Science and Engineering, Graduate School of Engineering, Kobe University
10:15 a.m.-10:30 a.m.	Coffee break	
10:30 a.m.-11:00 a.m.	“Electrocatalytic Membrane Reactor-based Integrated Processes for Landfill Leachate Treatment”	<u>Prof. Jianxin Li</u> ; Tianjin Distinguished Professor, Director of National Center for International Joint Research on Membrane Science and Technology, Tianjin Polytechnic University, P.R. China
11:00 a.m.-11:30 a.m.	“Impacts of Zwitterionic Membranes in Medical Applications ”	<u>Prof. Yung Chang</u> ; Director Center for Excellence, Ministry of Education, R & D Center for Membrane Technology, Chung Yuan Christian University, Taiwan
11:30 a.m.-12:00 a.m.	“Catalytic membranes based on in-situ generated dendritic supramolecular structures”	<u>Prof. Bhekie Mamba</u> ; Executive Dean College of Engineering, Science and Technology, University of South Africa (UNISA)
12:00 a.m.-12:30 p.m.	“Selective Modification of Membrane Pore and External Surface - Magnetically Responsive Membranes”	<u>Prof. Ranil Wickramasinghe</u> ; Center Director, Membrane Science, Engineering and Technology Center, University of Arkansas, USA
12:30 p.m.-1:30 p.m.	Lunch & Poster Session	
1:30 p.m.-2:00 p.m.	“A multiscale modeling study of the formation of porous polymer membranes by phase inversion”	<u>Prof. David Ford</u> ; Head Ralph E Martin Department of Chemical Engineering, University of Arkansas, USA
2:00 p.m.-2:30 p.m.	“Structure, function and applications of collagenase from <i>Hathewayia histolytica</i> ”	<u>Prof. Joshua Sakon</u> ; Department of Chemistry and Biochemistry, University of Arkansas, USA
2:30 p.m.-3:00 p.m.	“Novel Membranes for Responsive Hydrophobic Interaction Chromatography Applications from Experiments and Simulations”	<u>Prof. Xianghong Qian</u> ; Department of Biomedical Engineering, University of Arkansas, USA
3:00 p.m.-3:15 p.m.	Coffee break	

3:15 p.m.-3:45 p.m.	“VIPS membranes for low-pressure/gravity-driven separation of oil and water”	<u>Prof. Antoine Venault</u> ; Chung Yuan Christian University, Taiwan
3:45 p.m.-4:15 p.m.	“Formation-structure-performance of polymeric membranes: Modeling and direct observation using microfluidic platforms”	<u>Prof. Guy Ramon</u> ; Faculty of Civil and Environmental Engineering, Technion, Israel
4:15p.m. - 4:45 p.m.	“Treatment of poultry slaughterhouse wastewater using combined system”	<u>Prof. Kulyash Meiramkulova</u> ; Professor of Management and Engineering in the field of environmental protection of L.N. Gumilyov Eurasian National University
4:45 p.m.-5:15 p.m.	‘Next Steps’ Closing ceremony	<u>Profs. Matsuyama; Wickramasinghe and Ford</u>
6:00 p.m.-8:00 p.m.	Dinner ; Shogun Japanese Hibachi Steakhouse and Sushi, 4096 N Steele Blvd Fayetteville, AR, 72703	Speakers, invited guests
Friday, May 17 9:00 a.m.-11:00 a.m.	Tour of facilities, guests depart	Staff/faculty

