

VIRTUAL CONFERENCE

July 19–22, 2021

**MATERIALS CHALLENGES IN ALTERNATIVE AND
RENEWABLE ENERGY 2021 (MCARE 2021)**

**4TH ANNUAL ENERGY HARVESTING
SOCIETY MEETING (EHS 2021)**

MEETING GUIDE

Hosted and organized by:



Also organized by:



ceramics.org/mcare2021

WELCOME

Dear Colleagues and Friends,

Welcome to the Materials Challenges in Alternative & Renewable Energy Conference (MCARE 2021) and 4th Energy Harvesting Society Meeting (EHS 2021), organized by The American Ceramic Society (ACerS), the Korean Institute of Chemical Engineers (KIChE), and the Energy Harvesting Society (EHS).

MCARE 2021 is a premier forum to address opportunities of emerging materials technologies that support sustainability of a global society. MCARE 2021 brings together leading global experts from universities, industry, research and development laboratories, and government agencies to interact collaboratively and communicate materials technologies that address development of affordable, sustainable, environmentally friendly, and renewable energy conversion technologies.

EHS 2021 brings together the academic, government and industrial community from around the world to discuss and to exchange ideas about energy harvesting. In its 4th year, EHS will cover presentations related to energy harvesting; energy storage; potential applications of energy harvesters; emerging materials and device technologies; energy management; solar-thermal converters; multi-junction systems; and wireless power transfer.

We are happy that you are here and appreciate your participation. While we have to stay physically apart, we hope that this meeting will bring our community closer together through the many opportunities for discussion and interaction. We hope you enjoy the meeting and gain from this unique gathering of global scientists and engineers.

MCARE 2021 Organizing co-chairs



Hemmer

Eva Hemmer
(lead organizer)
University of Ottawa,
Canada



Gaustad

Gabrielle Gaustad
Alfred University, U.S.A.



Tidrow

Steven C. Tidrow
Alfred University, U.S.A.



Mathur

Sanjay Mathur
University of Cologne,
Germany



Hahn

Yoon-Bong Hahn
Jeonbuk National University,
Korea

EHS 2021 organizing co-chairs



Shashank Priya
The Pennsylvania State
University, U.S.A.



Jungho Ryu
Yeungnam University,
Korea



Yang Bai
University of Oulu,
Finland

PLENARY SPEAKERS

OPENING REMARKS | 9:20 a.m. – Monday only

MONDAY, JULY 19



KICChE Plenary Speaker | 9:40 a.m.

Prof. Taeghwan Hyeon

Distinguished professor, Seoul University, Korea

Title: *Chemistry for nano, and nano for medicine and energy*

TUESDAY, JULY 19



EHS Plenary Speaker | 9:00 a.m.

Prof. G. Jeffrey Snyder

Professor, Department of Materials Science & Engineering, Northwestern University, USA

Title: *Thermoelectrics for distributed cooling and energy harvesting*

WEDNESDAY, JULY 20



MCARE Plenary Speaker | 9:00 a.m.

Dr. Eva Unger

Young investigator group leader, HySPRINT Innovation Lab, Helmholtz-Zentrum Berlin für Materialien und Energie, Germany

Title: Hybrid perovskites - materials formation and scalings

Thank You to Our Sponsors



WILEY



EHS SESSION

TITLE	DATE	TIME (Eastern)
EHS Plenary Speaker	Tuesday, July 20, 2021	9:00 - 9:45 AM
EHS S1: Materials, Components and Devices for Self-powered Electronics I (Joint with MCARE Symp 6)	Wednesday, July 21, 2021	10:00 - 11:00 AM
EHS S2: Integrated Energy Harvesting and Storage Systems for Wearables and IoT	Thursday, July 22, 2021	11:15 - 12:00 PM
EHS S3: Multi-functional Energy Conversion Materials and Devices for Energy Harvesting and/or Sensing I	Wednesday, July 21, 2021	2:15 - 4:45 PM
EHS S3: Multi-functional Energy Conversion Materials and Devices for Energy Harvesting and/or Sensing II	Thursday, July 22, 2021	9:00 - 11:00 AM
EHS S4: Thermoelectric Energy Harvesting I (Joint with MCARE Symp 3)	Tuesday, July 20, 2021	12:30 - 2:00 PM
EHS S4: Thermoelectric Energy Harvesting II (Joint with MCARE Symp 3)	Tuesday, July 20, 2021	2:45 - 4:30 PM
EHS S5: Special Symposium - Celebrating 20 Years of Energy Harvesting	Monday, July 19, 2021	10:30 - 12:30 PM
EHS S6: Special Symposium: European Energy Harvesting Workshop with Special Honor to Professor Pim W.A. Groen	Wednesday, July 21, 2021	10:00 - 12:00 PM

MCARE SESSION

TITLE	DATE	TIME (Eastern)
Opening Remarks and KICHe Plenary Speaker	Monday, July 19, 2021	9:20 - 10:20 AM
MCARE Plenary Speaker	Wednesday, July 21, 2021	9:00 - 9:45 AM
MCARE S1: Photocatalysts for Hydrogen Evolution Reaction	Monday, July 19, 2021	10:30 - 11:15 AM
MCARE S1: General Photocatalysts	Monday, July 19, 2021	11:45 - 1:00 PM
MCARE S1: Photocatalysts for Water Splitting	Monday, July 19, 2021	1:30 - 3:00 PM
MCARE S1: Photocatalysts for Oxygen Evolution Reaction	Monday, July 19, 2021	3:00 - 4:15 PM
MCARE S2: Advanced Materials for Energy Storage	Wednesday, July 21, 2021	10:00 - 11:45 AM
MCARE S4: Advanced Materials for Perovskite and Next Generation Solar Cells	Thursday, July 22, 2021	12:20 - 12:35 PM
MCARE S5: Materials for Upconversion, Downconversion / Quantum Cutting, Luminescent Downshifting I	Monday, July 19, 2021	10:30 - 12:30 PM
MCARE S5: Materials for Upconversion, Downconversion / Quantum Cutting, Luminescent Downshifting II	Monday, July 19, 2021	1:30 - 3:00 PM
MCARE S5: Materials for Upconversion, Downconversion / Quantum Cutting, Luminescent Downshifting III	Tuesday, July 20, 2021	12:30 - 2:15 PM
MCARE S5: Multifunctional Spectral Conversion Materials: Applications Beyond the Energy Sector	Tuesday, July 20, 2021	2:45 - 4:15 PM
MCARE S5: Development and Synthesis of Novel Optical Materials I	Wednesday, July 21, 2021	10:00 - 12:00 PM
MCARE S5: Development and Synthesis of Novel Optical Materials II	Wednesday, July 21, 2021	2:15 - 3:45 PM
MCARE S5: Plasmonic / Photonic Manipulation of Conversion Processes I	Thursday, July 22, 2021	9:00 - 10:30 AM
MCARE S5: Plasmonic / Photonic Manipulation of Conversion Processes II	Thursday, July 22, 2021	10:45 - 12:00 PM
MCARE S5: Lanthanides, Dyes and Quantum Confined Nanomaterials for Photovoltaic Applications	Thursday, July 22, 2021	1:00 - 3:00 PM
MCARE S6: Materials, Components and Devices for Self-powered Electronics II (Joint with EHS Symp 1)	Thursday, July 22, 2021	9:00 - 11:30 AM
MCARE S7: Advanced Materials and Nanodevices for Sustainable and Eco-friendly Applications I	Monday, July 19, 2021	10:30 - 12:00 PM
MCARE S7: Advanced Materials and Nanodevices for Sustainable and Eco-friendly Applications II	Monday, July 19, 2021	1:30 - 3:30 PM
MCARE S8: Advanced Materials for Fuel Cells and High Temperature Electrolysis	Thursday, July 22, 2021	10:50 - 12:05 PM
MCARE S9: Critical Materials for Energy	Thursday, July 22, 2021	9:00 - 10:15 AM
MCARE S10: Lifecycle Impacts of Clean Energy Materials	Thursday, July 22, 2021	10:20 - 10:50 AM



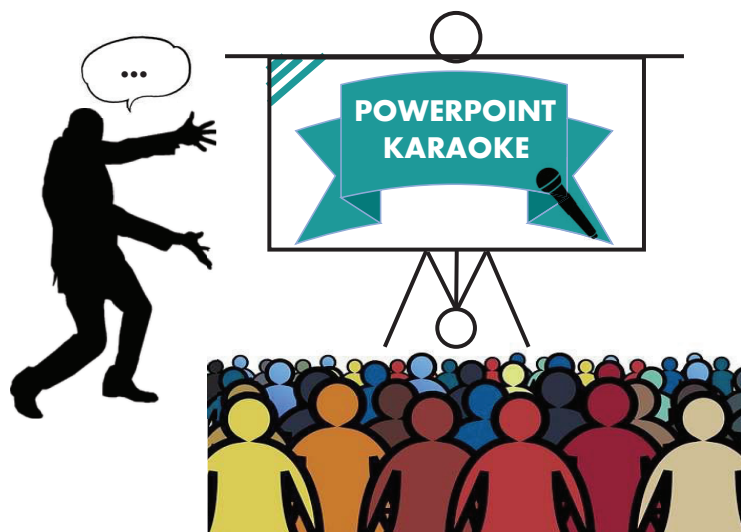
MCARE SESSION

TITLE	DATE	TIME (Eastern)
MCARE S11: Materials for Super Ultra-low Energy and Emission Vehicles	Thursday, July 22, 2021	2:00 - 4:45 PM
MCARE S13: Theory and Experiment Meeting in Energy Materials Research	Thursday, July 22, 2021	1:00 - 2:15 PM
MCARE 14: Chemical and Biological Sensors	Thursday, July 22, 2021	9:00 - 12:00 PM
MCARE S15: Advances in Fundamental Science and Development of Photovoltaic Materials and Devices	Wednesday, July 21, 2021	10:00 - 11:30 AM
MCARE S15: Materials and Devices for Energy Production and Storage	Wednesday, July 21, 2021	2:15 - 5:45 PM
MCARE S16: Solar Energy Harvesting I	Monday, July 19, 2021	10:30 - 12:15 PM
MCARE S16: Solar Energy Harvesting II	Monday, July 19, 2021	1:30 - 4:00 PM
MCARE S16: Solar Energy Harvesting III	Tuesday, July 20, 2021	12:30 - 2:45 PM

POSTER SESSION

TITLE	DATE	TIME (Eastern)
Poster Session 1A (live presentations)	Tuesday, July 20, 2021	10:00 - 10:30 AM
Poster Session 1B (live presentations)	Tuesday, July 20, 2021	10:30 - 11:00 AM
Poster Session 1C (live presentations)	Tuesday, July 20, 2021	11:00 - 11:30 AM
Poster Session 2A (live presentations)	Wednesday, July 21, 2021	1:00 - 1:30 PM
Poster Session 2B (live presentations)	Wednesday, July 21, 2021	1:30 - 2:00 PM

On-demand Poster Session (All posters available the duration of the conference)
Monday, July 19, 2021 | begins 9:00 AM



What? When? Where? How?



JULY 21, 2021



8:00 – 8:50 a.m. (EDT)



ZOOM

Access the event through the [Bravura agenda](#).

Oral Presenters

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A					I				
Adam, R.	21-Jul	10:30AM	Room 2	10	Ichangi, A.	22-Jul	10:30AM	Room 3	13
Aliyana, A.K.	22-Jul	11:15AM	Room 4	15	J				
Almeida, R.M.	19-Jul	1:30PM	Room 1	6	Jang, M.	22-Jul	2:45PM	Room 2	15
Amadi, C.K.	19-Jul	2:15PM	Room 4	6	Je, M.	22-Jul	1:45PM	Room 3	16
Aytuna, Z.	20-Jul	12:45PM	Room 4	9	Jeong, S.	22-Jul	11:00AM	Room 4	15
B					Ji, S.	22-Jul	2:00PM	Room 3	16
Bai, Y.	22-Jul	10:45AM	Room 3	13	Jo, Y.	22-Jul	9:15AM	Room 4	14
Bekenstein, Y.	21-Jul	10:30AM	Room 1	10	Jo, Y.	22-Jul	9:30AM	Room 4	14
Benetti, D.	20-Jul	1:45PM	Room 1	9	Jones, C.M.	19-Jul	2:00PM	Room 1	6
Bera, S.	19-Jul	12:00PM	Room 4	5	Jung, H.	22-Jul	11:45AM	Room 3	15
Bohr, C.	22-Jul	12:20PM	Room 2	15	Jung, Y.	22-Jul	10:50AM	Room 2	14
Boomi Shankar, R.	22-Jul	9:00AM	Room 3	12	K				
Borras, A.	21-Jul	2:15PM	Room 3	11	Kamura, S.	22-Jul	10:45AM	Room 4	15
Brozek, C.K.	21-Jul	3:15PM	Room 4	12	Kang, H.	20-Jul	4:15PM	Room 3	9
C					Karakovskaya, K.	19-Jul	11:45AM	Room 5	5
Caliari, F.R.	20-Jul	3:15PM	Room 3	8	Khan, H.	19-Jul	11:30AM	Room 4	5
Caliari, F.R.	21-Jul	11:30AM	Room 2	10	Khanbareh, H.	22-Jul	9:30AM	Room 3	12
Camargo, P.	22-Jul	9:45AM	Room 1	13	Kim, D.	19-Jul	11:45AM	Room 2	4
Chan, E.	21-Jul	2:45PM	Room 1	12	Kim, D.	22-Jul	9:30AM	Room 2	14
Chen, S.	19-Jul	3:30PM	Room 2	5	Kim, J.	19-Jul	2:00PM	Room 5	6
Chen, Y.	22-Jul	9:00AM	Room 2	14	Kim, J.	22-Jul	9:30AM	Room 1	13
Chen, Y.	22-Jul	10:20AM	Room 2	14	Kim, S.	22-Jul	9:00AM	Room 5	13
Cho, S.	22-Jul	4:30PM	Room 2	16	Kitai, A.	20-Jul	2:45PM	Room 1	9
Choi, H.	20-Jul	1:45PM	Room 4	9	Ko, D.	22-Jul	9:00AM	Room 1	13
Choi, H.	22-Jul	9:15AM	Room 5	13	Kullgren, J.	20-Jul	1:00PM	Room 4	9
Choi, H.	22-Jul	1:30PM	Room 3	16	Kumar, A.	22-Jul	9:30AM	Room 5	13
Choi, M.	22-Jul	10:15AM	Room 5	13	L				
Choi, Y.	19-Jul	11:15AM	Room 5	5	Lee, D.	21-Jul	10:45AM	Room 2	10
Cobb, C.L.	21-Jul	5:15PM	Room 4	12	Lee, E.	22-Jul	2:30PM	Room 2	15
Crane, D.	20-Jul	2:45PM	Room 3	8	Lee, H.	19-Jul	2:00PM	Room 2	5
Crovetto, A.	21-Jul	10:30AM	Room 4	11	Lee, H.	22-Jul	4:15PM	Room 2	16
D					Lee, K.	22-Jul	3:45PM	Room 2	16
Datye, A.K.	22-Jul	2:00PM	Room 2	15	Lee, M.	19-Jul	10:45AM	Room 2	4
de Souza, F.L.	19-Jul	3:30PM	Room 4	6	Lee, S.	19-Jul	10:30AM	Room 5	5
Dorman, J.	20-Jul	1:00PM	Room 1	9	Li, H.	21-Jul	10:45AM	Room 5	10
Drazin, J.	22-Jul	11:50AM	Room 2	14	Li, W.	20-Jul	1:30PM	Room 3	8
Dunn, S.	21-Jul	11:00AM	Room 3	10	Lim, J.	19-Jul	1:30PM	Room 5	6
Dunn, S.	21-Jul	2:45PM	Room 3	11	Lim, S.	22-Jul	3:00PM	Room 2	15
F					Lin, Y.	21-Jul	11:00AM	Room 4	11
Feldhoff, A.	20-Jul	12:30PM	Room 3	8	Liu, F.	22-Jul	9:15AM	Room 2	14
Ferrari, M.	19-Jul	12:00PM	Room 1	4	Liu, N.	21-Jul	4:30PM	Room 3	12
Fischer, T.	19-Jul	1:45PM	Room 2	5	Lu, K.	21-Jul	10:15AM	Room 5	10
Fischer, T.	19-Jul	2:45PM	Room 5	6	M				
Frank, M.	20-Jul	12:30PM	Room 4	9	Mahmoudi, T.	19-Jul	11:45AM	Room 4	5
G					Makarenko, A.	21-Jul	10:00AM	Room 5	9
Gilzad Kohan, M.	22-Jul	10:15AM	Room 1	13	Mandal, D.	22-Jul	10:00AM	Room 3	12
Görlin, M.	19-Jul	3:00PM	Room 2	5	Mao, Y.	20-Jul	1:30PM	Room 1	9
Graf, D.	22-Jul	11:30AM	Room 4	15	Mao, Y.	20-Jul	3:45PM	Room 1	9
Graziani, S.	22-Jul	11:15AM	Room 3	15	Mao, Y.	20-Jul	4:00PM	Room 1	9
H					Martinazzo Rodrigues, E.	19-Jul	2:15PM	Room 1	6
Hadas, Z.	21-Jul	3:15PM	Room 3	12	Mascher, P.	21-Jul	2:15PM	Room 1	12
Hahn, Y.	19-Jul	10:30AM	Room 4	5	Méndez-Ramos, J.	22-Jul	10:45AM	Room 1	13
Hemmer, E.	19-Jul	3:00PM	Room 4	6	Menéndez-Velázquez, A.	22-Jul	1:00PM	Room 1	15
Hendricks, T.J.	20-Jul	3:30PM	Room 3	8	Mesaki, S.	22-Jul	9:45AM	Room 2	14
Hermansson, K.	19-Jul	2:30PM	Room 4	6	Mishra, S.	19-Jul	11:30AM	Room 1	4
Holmberg, V.C.	21-Jul	4:45PM	Room 4	12	Mishra, T.	22-Jul	1:00PM	Room 3	16
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Hong, S.	22-Jul	9:00AM	Room 4	14	Moon, Y.	22-Jul	9:45AM	Room 4	14
Hosur, S.S.	22-Jul	11:00AM	Room 5	14	Mukkavilli, R.	19-Jul	11:00AM	Room 5	5
Huda, M.N.	19-Jul	2:30PM	Room 2	5	N				
Hwang, J.	20-Jul	1:00PM	Room 3	8	Nahrstedt, V.	20-Jul	1:30PM	Room 4	9
Hyeon, T.	19-Jul	9:40AM	Room 1	4	Ning, K.	22-Jul	10:45AM	Room 5	14
					Nozariasbmarz, A.	20-Jul	1:45PM	Room 3	8

Presenting Author List

Oral Presenters

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Odabasi Lee, S.	19-Jul	10:30AM	Room 2	4	Swearer, D.F.	19-Jul	2:30PM	Room 1	6
Okosun, F.	22-Jul	10:00AM	Room 5	13	Szanyi, J.	22-Jul	3:15PM	Room 2	15
Orgiu, E.	21-Jul	3:45PM	Room 4	12	T				
P					Torai, S.	22-Jul	10:15AM	Room 4	14
Pak, C.	22-Jul	11:20AM	Room 2	14	Tryakhov, D.E.	19-Jul	11:30AM	Room 5	5
Park, S.	22-Jul	10:00AM	Room 4	14	Twiefel, J.	19-Jul	11:00AM	Room 3	4
Patil, D.	22-Jul	9:45AM	Room 5	13	U				
Peter, S.	19-Jul	3:15PM	Room 5	6	Uddin, M.	19-Jul	12:30PM	Room 2	4
Poudel, B.	20-Jul	1:15PM	Room 3	8	Uenlue, F.	19-Jul	2:00PM	Room 4	6
Poudel, B.	20-Jul	4:00PM	Room 3	8	Unger, E.	21-Jul	9:05AM	Room 1	9
Priya, S.	21-Jul	11:30AM	Room 3	10	V				
R					van der Zwag, S.	21-Jul	10:00AM	Room 3	10
Randall, C.	21-Jul	10:30AM	Room 3	10	Vela, J.	19-Jul	12:00PM	Room 2	4
Reid, O.G.	21-Jul	10:00AM	Room 4	10	Verma, A.	19-Jul	2:30PM	Room 5	6
Resch-Genger, U.	19-Jul	11:00AM	Room 1	4	Vomiero, A.	21-Jul	11:00AM	Room 1	10
Ribeiro, S.J.	22-Jul	2:00PM	Room 1	15	W				
Roh, H.	19-Jul	4:00PM	Room 2	6	Wang, Y.	19-Jul	11:00AM	Room 4	5
Roundy, S.	19-Jul	12:00PM	Room 3	4	Westin, G.	19-Jul	1:30PM	Room 4	6
Ryu, J.	19-Jul	10:30AM	Room 3	4	Westin, G.	21-Jul	11:30AM	Room 1	10
S					Wilhelm, M.	21-Jul	10:15AM	Room 2	10
Sadaf, M.	19-Jul	3:00PM	Room 5	6	Wu, D.	21-Jul	2:45PM	Room 4	12
Sadaf, M.	21-Jul	3:45PM	Room 3	12	Wu, N.	22-Jul	2:30PM	Room 1	15
Santato, C.	20-Jul	3:15PM	Room 1	9	Y				
Schlenker, C.W.	21-Jul	2:15PM	Room 4	12	Yoon, J.	21-Jul	10:00AM	Room 2	10
Schmidt-Verma, A.K.	19-Jul	2:15PM	Room 5	6	You, S.	22-Jul	1:30PM	Room 1	15
Schuck, J.	20-Jul	12:30PM	Room 1	9	Yu, K.	21-Jul	10:00AM	Room 1	10
Sekhar, P.	22-Jul	11:45AM	Room 4	15	Yue, Y.	21-Jul	11:00AM	Room 2	10
Sharma, A.	21-Jul	4:15PM	Room 3	12	Z				
Shifa, T.A.	22-Jul	11:15AM	Room 1	13	Zhang, J.Z.	20-Jul	2:15PM	Room 4	9
Shim, J.	22-Jul	4:00PM	Room 2	16	Zhang, J.Z.	21-Jul	3:15PM	Room 1	12
Snyder, G.	20-Jul	9:05AM	Room 1	7	Zheng, L.	21-Jul	4:00PM	Room 3	12
Solomon, G.	22-Jul	11:45AM	Room 1	13	Zuo, L.	19-Jul	11:30AM	Room 3	4
Son, H.	22-Jul	11:35AM	Room 2	14					
Spurgeon, S.R.	21-Jul	4:15PM	Room 4	12					
Sriramadas, R.	21-Jul	10:30AM	Room 5	10					
Sun, T.	19-Jul	10:30AM	Room 1	4					

Poster Presenters

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Choi, S.H.	20-Jul	11:00AM	Room 1	8	Kim, G.M.	20-Jul	10:00AM	Room 1	7
Choi, Y.	20-Jul	11:00AM	Room 1	8	Kim, H.	20-Jul	10:30AM	Room 1	8
Choudhury, B.	21-Jul	1:00PM	Room 1	11	Kim, J.	20-Jul	11:00AM	Room 1	8
Chung, Y.	20-Jul	11:00AM	Room 1	8	Kim, M.	19-Jul	9:00AM	Room 1	7
F					Kim, Y.	19-Jul	9:00AM	Room 1	7
Fasogbon, S.K.	21-Jul	1:30PM	Room 1	11	Koo, Y.	20-Jul	10:30AM	Room 1	8
Flores, A.	21-Jul	1:30PM	Room 1	11	L				
H					Lee, I.	20-Jul	10:00AM	Room 1	7
Huang, R.	19-Jul	9:00AM	Room 1	7	Lee, S.	20-Jul	11:00AM	Room 1	8
Hwang, Y.	20-Jul	10:00AM	Room 1	7	Lim, C.	20-Jul	10:30AM	Room 1	7
J					Lu, P.	19-Jul	9:00AM	Room 1	7
Jeong, C.	20-Jul	10:00AM	Room 1	7	M				
Jung, H.	20-Jul	11:00AM	Room 1	8	Merkey, E.	21-Jul	1:00PM	Room 1	11
N					N				
					Nguyen, H.Q.	19-Jul	9:00AM	Room 1	7
					Ning, K.	21-Jul	1:00PM	Room 1	11

Poster Presenters

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Pak, C.	20-Jul	11:00AM	Room 1	8	Whaley, T.L.	21-Jul	1:30PM	Room 1	11
Park, Y.	20-Jul	10:00AM	Room 1	7	Y				
Pellegrin, V.R.	21-Jul	1:30PM	Room 1	11	Yim, H.	20-Jul	10:00AM	Room 1	7
S					Youngbin, L.	20-Jul	10:30AM	Room 1	8
Senn, W.D.	21-Jul	1:00PM	Room 1	11	Yu, L.	20-Jul	10:30AM	Room 1	7
Shawon, S.	21-Jul	1:30PM	Room 1	11	Yun, S.	20-Jul	10:00AM	Room 1	7
Shin, D.	19-Jul	9:00AM	Room 1	7	Z				
Shin, J.	20-Jul	10:00AM	Room 1	7	Zamora, D.L.	21-Jul	1:30PM	Room 1	11
Strimaitis, J.	19-Jul	9:00AM	Room 1	7	Zhang, L.	20-Jul	10:00AM	Room 1	7
T									
Tasnim, F.	21-Jul	1:30PM	Room 1	11					
Torres-García, S.	21-Jul	1:00PM	Room 1	11					

Monday, July 19, 2021

KIChE Plenary

Opening Remarks and Plenary Speaker 1

Session Chair: Yoon-Bong Hahn, Chonbuk National University

9:00 AM

Opening Remarks: Shashank Priya, Pennsylvania State University; Sanjay Mathur, University of Cologne; Yoon-Bong Hahn, Chonbuk National University; Dana Goski, ACerS President

9:40 AM

(KIChE-PLEN-2021) Chemistry for Nano, and Nano for Medicine and Energy

T. Hyeon*¹

1. Seoul National University, School of Chemical and Biological Engineering, Republic of Korea

EHS S5: Special Symposium - Celebrating 20 Years of Energy Harvesting

Session Chair: Shashank Priya, Pennsylvania State University

10:30 AM

(EHS-001-2021) An emerging magnetic energy harvesting technology with magnetoelectrics (Invited)

J. Ryu*¹

1. Yeungnam University, Republic of Korea

11:00 AM

(EHS-002-2021) Experimental investigations of the parameter influences on the usable bandwidth of passive self-tuning vibratory energy harvesters (Invited)

J. Twiefel*¹

1. Leibniz Universität Hannover, Institut für Dynamik und Vibration Research, Germany

11:30 AM

(EHS-003-2021) Ocean Energy Harvesting and Powering the Blue Economy (Invited)

L. Zuo*¹

1. Virginia Tech, Mechanical Engineering, USA

12:00 PM

(EHS-004-2021) Powering the Internet of Things: Perspectives on Energy Harvesting from Motion and Vibrations (Invited)

S. Roundy*¹

1. University of Utah, Mechanical Engineering, USA

MCARE S1: Photocatalysts for Hydrogen Evolution Reaction

Session Chair: Yung-Jung Hsu, National Chiao-Tung University

10:30 AM

(MCARE-001-2021) Comparison of g-C₃N₄ and Its Heteronanocomposites for Their Hydrogen Production Activities

S. Odabasi Lee*¹; K. Yong¹

1. Pohang University of Science and Technology, Chemical Engineering, Republic of Korea

10:45 AM

(MCARE-002-2021) Facile introduction of oxygen vacancy to BiVO₄ photoanode and its enhanced STH efficiency with perovskite solar cell

M. Lee*¹; K. Yong¹

1. POSTECH, Chemical Engineering, Republic of Korea

11:00 AM

(MCARE-003-2021) Preparation of hierarchical g-C₃N₄/TiO₂ hollow spheres with highly enhanced photocatalytic activity

H. Moon*¹; K. Yong¹

1. POSTECH, Chemical engineering, Republic of Korea

MCARE S1: General Photocatalysts

Session Chair: Yuanbing Mao, Illinois Institute of Technology

11:45 AM

(MCARE-004-2021) 2D-Ni(Co,Fe)P/1D-WO_x Electrocatalysts for Overall Efficient Water Splitting

D. Kim*¹; K. Yong¹

1. POSTECH, Republic of Korea

12:00 PM

(MCARE-005-2021) Nitrate Reduction over Nickel Phosphide Nanocatalysts (Invited)

J. Vela*¹

1. Iowa State University, Chemistry, USA

12:30 PM

(MCARE-006-2021) Polymer Passivated Cell Showing Exceptionally High Light-to-Current Conversion Efficiency (Invited)

M. Uddin*¹

1. University of Texas Rio Grande Valley, Chemistry, USA

MCARE S5: Materials for Upconversion, Downconversion / Quantum Cutting, Luminescent Downshifting I

Session Chair: Eva Hemmer, University of Ottawa

10:30 AM

(MCARE-007-2021) Lanthanide-Based Luminescent Materials for Waveguide and Lasing (Invited)

T. Sun*¹; F. Wang²

1. Sun Yat-sen University, School of Chemical Engineering and Technology, China
2. City University of Hong Kong, Department of Materials Science and Engineering, Hong Kong

11:00 AM

(MCARE-008-2021) Measuring the Upconversion Luminescence of Ensemble and Single Particle Lanthanide-Based Upconversion Nanocrystals (Invited)

U. Resch-Genger*¹; F. Frenzel¹; C. Wuertel¹; B. Grauel¹; T. Hirsch²; M. Haase³

1. BAM Federal Institute for Material Research and Testing, Germany
2. University of Regensburg, Institute of Analytical Chemistry, Germany
3. University of Osnabrueck, Institute of Chemistry/New Materials, Germany

11:30 AM

(MCARE-009-2021) Employing anhydrous molecular precursors as a strategy to enhance up-conversion efficiency in Ln³⁺-doped MM'F₄ (M = Li, Na; M' = Y, Gd) (Invited)

S. Mishra*¹; B. Purohit¹; E. Jeanneau²; G. Ledoux²; M. Joubert³; C. Dujardin³; Y. Guyot³; D. Amans²; B. Mahler²

1. University of Lyon1, Institut de Recherches sur l'Environnement et la Catalyse de Lyon (IRCELYON), France
2. Centre de Diffractionométrie Henri Longchambon, France
3. Institut Lumière Matière, France

12:00 PM

(MCARE-010-2021) Photonic glass ceramics for frequency conversion (Invited)

L. Tran¹; K. Startek²; O. Sayginer¹; S. Varas¹; C. Armellini¹; A. Chiappini¹; A. Carpentiero¹; M. Bollani²; F. Scotognella²; M. Ferrari*³; G. C. Righini³; P. Gluchowski⁴; A. Lukowiak⁴; A. Chiasera¹

1. IFN-CNR CSMFO Lab. and FBK Photonics Unit, Italy
2. Lukaszewicz Research Network – PORT Polish Center for Technology Development, Poland
3. IFN-CNR, P.zza Leonardo da Vinci, Italy
4. Dipartimento di Fisica, Politecnico di Milano, Italy
5. MiPLab, IFAC-CNR, Italy
6. Institute of Low Temperature and Structure Research, PAS, Poland

MCARE S7: Advanced Materials and Nanodevices for Sustainable and Eco-friendly Applications I

Session Chair: Yeon Ho Im, Chonbuk National University

10:30 AM

(MCARE-011-2021) Functional Electronic and Photonic Devices Integrated with Hybrid Heterostructures based on Two-dimensional Materials (Invited)

S. Baek¹; C. Shin¹; H. Son¹; H. Choi¹; S. Choi¹; S. Lee^{*1}

1. Sungkyunkwan University, SAINT, Republic of Korea

11:00 AM

(MCARE-012-2021) Electrospun Ta₃N₅-(O) fibers as advanced electrocatalysts for hydrogen evolution reaction

R. Mukkavilli^{*1}; A. Ichang²; G. Thiyagarajan¹; L. Neelakantan¹; S. Christiansen³; S. Mathur²; R. Kumar¹

1. Indian Institute Of Technology, Madras, Metallurgical and Materials Engineering, India
2. University Of Cologne, Inorganic and Materials chemistry, Germany
3. 1. FhG IKTS Dresden, Dresden, Germany. 2. Fraunhofer IKTS, Dresden, Saxony, Germany., Germany

11:15 AM

(MCARE-013-2021) Biosynthesis of inorganic nanomaterials and their energy harvesting and storage applications

Y. Choi^{*1}; T. Park²; D. Lee³; S. Lee¹

1. Korea Advanced Institute of Science and Technology, BioProcess Engineering Research Center, Republic of Korea
2. Chung-Ang University, Department of Chemistry, Republic of Korea
3. Korea Advanced Institute of Science and Technology, Department of Chemical and Biomolecular Engineering, Republic of Korea

11:30 AM

(MCARE-014-2021) MOCVD formation and study of AuNPs-decorated Pd and Pt coatings

D. E. Tryakhov^{*1}

1. NIIC, Russian Federation

11:45 AM

(MCARE-015-2021) MOCVD of noble metal film materials onto medical implants: microstructure and biocompatibility of iridium- and gold-based coatings

K. Karakovskaya^{*1}; E. Vikulova¹; I. Korolkov¹; T. Koretskaya¹; I. Asanov¹; A. Tsygankova¹; E. Maksimovskii¹; N. Morozova²; E. Chepeleva²; Y. Lantsukhay²; A. Zheravin²; E. Marchenko³

1. Nikolaev Institute of Inorganic Chemistry, Russian Federation
2. Meshalkin National Medical Research Center, Russian Federation
3. Kuznetsov Siberian Physical-Technical Institute, Russian Federation

MCARE S16: Solar Energy Harvesting I

Session Chair: Sanjay Mathur, University of Cologne

10:30 AM

(MCARE-016-2021) Highly Stable and Efficient Perovskite Solar Cells with Functional Composites (Invited)

Y. Hahn^{*1}

1. Jeonbuk National University, School of Semiconductor and Chemical Engineering, Republic of Korea

11:00 AM

(MCARE-017-2021) Fully-ambient-air Processed Perovskite Solar Cells with Perovskite-based Composites and Interface Engineering (Invited)

Y. Wang^{*1}

1. Jinan University, Institute of New Energy Technology, China

11:30 AM

(MCARE-018-2021) Improved Optical and Photoelectrochemical Properties of Surface Patterned Titanium Indium Oxide Thin Film via Sol-Gel Based Soft Lithography

H. Khan^{*1}; S. Kwon¹

1. Pusan National University, School of Materials Science and Engineering, Republic of Korea

11:45 AM

(MCARE-019-2021) SrTiO₃/Al₂O₃-Graphene Electron Transport Layer for Highly Stable and Efficient Composites-Based Perovskite Solar Cells with 20.6 % Efficiency

T. Mahmoudi^{*1}; Y. Hahn¹

1. Chonbuk National University, Chemical Engineering, Republic of Korea

12:00 PM

(MCARE-020-2021) Hybrid Seeded Growth SnO₂ Nanowires for Heterostructure Electrodes with Enhanced Photoelectrochemical Performance

S. Bera^{*1}; S. Kwon¹

1. Pusan National University, School of Materials Science and Engineering, Republic of Korea

MCARE S1: Photocatalysts for Water Splitting

Session Chair: Yuanbing Mao, Illinois Institute of Technology

1:30 PM

(MCARE-021-2021) Inhibition of charge recombination by combining WO_x and g-C₃N₄ : Analysis of charge transfer by PL, TRPL

I. Hong^{*2}; K. Yong¹

1. Engineering Ceramics Research, Korea Institute of Materials Science, Chemical Engineering, Republic of Korea
2. Engineering Ceramics Research, Korea Institute of Materials Science, Republic of Korea

1:45 PM

(MCARE-022-2021) Fields Matter: Better Water Splitting Through Magnetic Field-Assisted Processing of Hematite Thin Films

D. Stadler¹; M. Pyeon¹; V. Rauch¹; M. Gürsoy¹; M. Deo¹; Y. Gönüllü¹; T. Fischer^{*1}; T. Hwang²; S. Mathur³

1. University of Cologne, Institute of Inorganic Chemistry, Germany
2. Korea Institute of Industrial Technology (KITECH), Republic of Korea
3. Selçuk Üniversitesi, Turkey

2:00 PM

(MCARE-023-2021) Effect of dipole moments built in bilayer interfaces on photo-electrochemical water splitting (Invited)

H. Lee^{*1}; V. Nahrstedt¹; H. Choi¹; S. Mathur¹

1. University of Cologne, Germany

2:30 PM

(MCARE-024-2021) Formation of polarons and their electronic structures within oxide-based photo-electrocatalysts (Invited)

M. N. Huda^{*1}

1. University of Texas at Arlington, Department of Physics, USA

MCARE S1: Photocatalysts for Oxygen Evolution Reaction

Session Chair: Zhenxing Feng, Oregon State University

3:00 PM

(MCARE-025-2021) Boosting effect in 3d metal oxygen evolution electrocatalysts investigated using in situ soft X-ray absorption spectroscopy (Invited)

D. Drevon²; V. Sikolenko³; D. Ojwang¹; M. Valvo¹; M. Risch⁴; H. Dau³; M. Görlin^{*1}

1. Uppsala University, Chemistry - Ångström laboratory, Sweden
2. Helmholtz Zentrum Berlin, Institute for Solar Fuels, Germany
3. Free University of Berlin, Physics, Germany
4. Helmholtz Zentrum Berlin, Young Investigator Group Oxygen Evolution Mechanism Engineering, Germany

3:30 PM

(MCARE-026-2021) Layered Double Hydroxides for Oxygen Evolution Reaction in Water Electrolysis (Invited)

S. Chen^{*1}

1. University of Houston, Physics, USA

4:00 PM**(MCARE-027-2021) Cost effective PV-EC system combining NiMP (M = Fe, Mo, Co, V) nanowire and perovskite solar cell**H. Roh*; K. Yong¹

1. POSTECH, Republic of Korea

MCARE S5: Materials for Upconversion, Downconversion / Quantum Cutting, Luminescent Downshifting II

Session Chair: Jose Marques-Hueso, Heriot-Watt University

1:30 PM**(MCARE-028-2021) Sol-gel Derived Up-Conversion Materials for Solid State Lighting (Invited)**R. M. Almeida*¹

1. Instituto Superior Técnico, Engenharia Química / CQE, Portugal

2:00 PM**(MCARE-029-2021) Direct Photoluminescence Quantum Yield (PLQY) Measurement with Temperature for Downshifting and Upconversion Using a Modified Integrating Sphere**C. M. Jones*; N. Panov²; A. Zhakeyev¹; E. Hemmer²; J. Marques-Hueso¹

1. Heriot-Watt University, Institute of Signals, Sensors and Systems (ISSS), United Kingdom
2. University of Ottawa, Department of Chemistry and Biomolecular Science, Canada

2:15 PM**(MCARE-030-2021) Hyperspectral imaging and optical trapping: Complimentary tools for assessing direction-dependent polarized emission from upconverting microparticles**N. Panov¹; D. Lu²; E. Ortiz-Rivero²; E. Martinazzo Rodrigues*¹; P. Haro²; D. Jaque²; E. Hemmer¹

1. University of Ottawa, Chemistry and Biomolecular Sciences, Canada
2. Universidad Autónoma de Madrid (UAM) and Ramon y Cajal Biomedical Research Institute (IRYCIS), Spain

2:30 PM**(MCARE-031-2021) Engineering an Alkaline-earth Host Lattice for Efficient Luminescence at the Single Particle Limit (Invited)**D. F. Swearer*; S. Fischer¹; D. Angell¹; J. Dionne¹

1. Stanford University, Material Science and Engineering, USA

MCARE S7: Advanced Materials and Nanodevices for Sustainable and Eco-friendly Applications II

Session Chair: Praveen Sekhar, Washington State University, Vancouver

1:30 PM**(MCARE-032-2021) Electrochemical process for energy application (Invited)**J. Lim*¹

1. Gachon, Republic of Korea

2:00 PM**(MCARE-033-2021) Photonic multilayer structure induced high near-infrared (NIR) blockage as energy-saving window**J. Kim*; S. Baek¹; J. Park¹; K. Kim²; J. Lee¹

1. Pohang University of Science and Technology (POSTECH), Pohang, Korea, Materials Science and Engineering, Republic of Korea
2. Pusan National University, Busan, Korea (the Republic of), Materials Science and Engineering, Republic of Korea

2:15 PM**(MCARE-034-2021) Robust Heat Resistant Superhydrophobic Coatings fabricated by functionalized Nanoparticles**A. K. Schmidt-Verma*; T. Fischer¹; S. Mathur¹

1. Universität zu Köln, Germany

2:30 PM**(MCARE-035-2021) LiTaO₃ Piezoelectric Devices**A. Verma*¹

1. University of Cologne, Germany

2:45 PM**(MCARE-036-2021) Magnetic Field-Assisted Chemical Vapor Deposition: New Pathways for Functional Materials**D. Stadler¹; T. Fischer*¹; I. Gessner¹; S. Mathur¹

1. University of Cologne, Institute of Inorganic Chemistry, Germany

3:00 PM**(MCARE-037-2021) A Piezo-Triboelectric Hybrid Energy Film Comprised of KNN/PVDF/MWCNT Composites for Energy Harvesting and Sensory Applications**A. Abdullah¹; M. Sadaf*¹; A. Chowdhury¹; M. Uddin¹

1. University of Texas Rio Grande Valley, Chemistry, USA
2. University of Texas Rio Grande Valley, Mechanical Engineering, USA

3:15 PM**(MCARE-038-2021) Glycothermal synthesis and photoluminescence of Mg-Si modified Ce:YAG nanophosphors**S. Peter*¹; M. Fitzpatrick²; A. Kitai¹

1. McMaster University, Engineering Physics, Canada
2. McMaster University, McMaster Analytical X-Ray Diffraction Facility, Canada

MCARE S16: Solar Energy Harvesting II

Session Chair: Heechae Choi, University of Cologne

1:30 PM**(MCARE-039-2021) Nanostructured complex oxides by solution chemistry (Invited)**G. Westin*¹

1. Uppsala University, Sweden

2:00 PM**(MCARE-040-2021) A-site cation engineering in bismuth perovskite-inspired materials for solar cells**F. Uenlue*¹; S. Mathur¹

1. University of Cologne, Chemistry Department, Germany

2:15 PM**(MCARE-041-2021) Volatile Mono and Di-hydrido Compounds of Aluminium**C. K. Amadi*¹; S. Mathur¹

1. Institute of Inorganic Chemistry, Chemistry, Germany

2:30 PM**(MCARE-042-2021) Materials characterization – where modelling meets experiment (Invited)**K. Hermansson*¹

1. Uppsala University, Uppsala, Sweden, Department of Chemistry-Angstrom, Sweden

3:00 PM**(MCARE-043-2021) Small yet bright lanthanide-based nanoparticles via rapid microwave-assisted synthesis (Invited)**E. Hemmer*¹

1. University of Ottawa, Chemistry and Biomolecular Sciences, Canada

3:30 PM**(MCARE-044-2021) Unraveling the role of Sn-segregation on hematite photoelectrodes interfaces for solar water splitting (Invited)**F. L. de Souza*¹

1. Federal University of ABC, Center of Natural Science and Humanity, Brazil

ON-DEMAND POSTERS

9:00 AM

(MCARE-ODP001-2021) Understanding the dynamic nature of acid sites on TiO₂-supported vanadia catalysts under SCR-relevant conditionsI. Song¹; D. Kim^{*1}

1. Seoul National University, Republic of Korea

(MCARE-ODP002-2021) Structure-Activity Relationship of VO_x/TiO₂ Catalysts for Mercury Oxidation: A DFT StudyD. Shin^{*1}; W. Yeo¹; M. Kim²; J. Han¹1. POSTECH, Republic of Korea
2. Daegu University, Republic of Korea**(MCARE-ODP003-2021) Challenges with Creating High Capacity Porous CaFe₂O₄ Anodes**J. Strimaitis^{*1}; S. Danquah¹; C. Denize¹; C. E. Bonner¹; S. Pradhan¹; M. Bahoura¹

1. Norfolk State University, USA

(MCARE-ODP004-2021) Improved OMS-2 catalysts for low temperature PM oxidationM. Kim^{*1}; J. Lee¹; E. Lee¹; K. Lee¹

1. Korea University, Republic of Korea

(MCARE-ODP005-2021) Exsolved Metal-Boosted Active Perovskite Oxide Catalyst for Stable Water Gas Shift ReactionR. Huang^{*1}; C. Lim¹; M. Jang¹; J. Hwang¹; J. Han¹

1. Pohang University of Science and Technology, Dept. of Chemical Engineering, Republic of Korea

(MCARE-ODP006-2021) Metal-organic framework-derived synthesis of CoS_x@NiCo₂S₄@Fe-PPY core-shell nanocages and their application for electrochemical reactionsH. Q. Nguyen^{*1}; J. Kim¹

1. Kyunghee University, Chemical Engineering, Republic of Korea

(MCARE-ODP007-2021) Boosting the Photocatalytic Hydrogen Production from Glucose Using π -conjugated Molecule Capping on Hybrid CdS-Pt NanoplateletP. Lu^{*1}; D. Lee¹

1. Korea Advanced Institute of Science and Technology, Republic of Korea

(MCARE-ODP008-2021) Synthesis of Fe-N-C electrocatalyst from EDTA-modified zirconium based MOF-808Y. Kim^{*1}; K. Im¹; H. Kwon²; J. Kim¹1. Kyung Hee university, Republic of Korea
2. Pukyong National University, Republic of Korea**(MCARE-ODP009-2021) Silver mediated Z-scheme electron transfer in MoO₃/C₃N₄ for efficient visible light photocatalytic degradation of pharmaceutical pollutant ofloxacin**S. Adhikari¹; D. Kim^{*1}

1. Chonnam National University, Chemical Engineering, Republic of Korea

Tuesday, July 20, 2021**EHS Plenary****EHS Plenary Speaker**

Session Chair: Shashank Priya, Pennsylvania State University

9:00 AM

Introduction

9:05 AM

(EHS-PLEN-2021) Thermoelectrics for Distributed Cooling and Energy HarvestingG. Snyder^{*1}

1. Northwestern University, Department of Material Science and Engineering, USA

Poster Session 1A (live presentations) also available in on-demand session

10:00 AM

(EHS-P-001-2021) Surface modification by dielectric nanosheets for high power lithium micro-batteriesH. Yim^{*1}; J. Choi¹

1. Korea Institute of Science and Technology, Republic of Korea

(EHS-P-002-2021) Porous organic filler for the high-temperature difference of Bi₂Te₃-based thermoelectric moduleS. Jung¹; J. Shin^{*1}; S. Lim¹; B. Kwon¹; S. Baek¹; H. Park¹; H. Song¹; C. Kang¹; J. Kim¹

1. Korea Institute of Science and Technology, Electronic material research center, Republic of Korea

(MCARE-P-003-2021) All-Solid-State Transparent Thin Film Lithium Ion Batteries with LiFePO₄ cathodeY. Hwang^{*1}; J. Choi¹

1. Center for Electronic Materials, Korea Institute of Science and Technology, Seoul, Korea (the Republic of), Republic of Korea

(MCARE-P-004-2021) Uniform amorphous FePO₄ nanospheres as cathode for sodium ion batteriesL. Zhang^{*1}; K. Kim¹

1. Pusan National University, Republic of Korea

(MCARE-P-005-2021) Effect of upconversion nanoparticles on photocatalytic activity of ZnFe₂O₄/TiO₂S. Lee¹; Y. Lim²; U. Sim²; Y. Park^{*1}1. Chonnam National University, School of Chemical Engineering, Republic of Korea
2. Chonnam National University, Department of Materials Science & Engineering, Republic of Korea**(MCARE-P-006-2021) Out-of-plane piezoelectric response of MoS₂ sheets on a flexible plastic substrate by highly controlled chemical vapor deposition**Y. Lim²; H. Kim²; C. Jeong^{*1}1. Jeonbuk National University, Division of Advanced Materials Engineering, Department of Energy Storage/Conversion Engineering of Graduate School, Republic of Korea
2. Jeonbuk National University, Department of Energy Storage/Conversion Engineering of Graduate School, Republic of Korea**(MCARE-P-007-2021) The high power density of water droplet-based triboelectric nanogenerator**S. Yun^{*1}; K. Yong¹

1. POSTECH, Chemical engineering, Republic of Korea

(MCARE-P-008-2021) Indium phosphide quantum dot-mediated bacterial infection treatment for drug-resistant bacteria inactivationI. Lee^{*1}; D. Lee¹

1. Korea Advanced Institute of Science and Technology, Chemical and Biomolecular Engineering, Republic of Korea

(MCARE-P-009-2021) Photocatalytic Activity of Colloidal Core-Position Controlled CdSe/CdS NanorodsG. M. Kim^{*1}; D. Lee¹

1. Korea Advanced Institute of Science and Technology, Chemical and Biomolecular Engineering, Republic of Korea

Poster Session 1B (live presentations) also available in on-demand session

10:30 AM

(MCARE-P-010-2021) NiSb nanoparticles anchored in 3D carbon nanosheet networks for advanced Lithium-ion batteryL. Yu^{*1}

1. Pusan National University, Republic of Korea

(MCARE-P-012-2021) The electro-catalyst composed with N-doping CNT and Bismuth Oxide for Nitrogen fixationC. Lim^{*1}; K. Yong¹; Y. Jeung¹

1. POSTECH, Republic of Korea

(MCARE-P-015-2021) Synthesis and characterization of HKUST-1 derived from hollow Cu₂OL. Youngbin*¹

1. Kyunghee University, Chemical Engineering, Republic of Korea

(MCARE-P-017-2021) Synthesis of Mo & Ru doped Zr-MOF(UiO-67) as stable and efficient electrocatalyst support for electrochemical reactionsY. Koo*¹

1. Kyunghee University, chemical engineering, Republic of Korea

(MCARE-P-018-2021) Design of an Ultrastable and Highly Active Ceria Catalyst for CO Oxidation by Rare-Earth- and Transition-Metal Co-DopingH. Kim*¹; D. Shin¹; J. Han¹

1. Pohang University of Science and Technology (POSTECH), Department of Chemical Engineering, Republic of Korea

Poster Session 1C (live presentations) also available in on-demand session**11:00 AM****(MCARE-P-020-2021) HC trap with Cu-ZSM-5 and correlation between Cu ions and hydrocarbon adsorption properties**J. Kim*¹

1. Korea University, Chemical and Biological Engineering, Republic of Korea

(MCARE-P-024-2021) Particle dynamics in coating and drying processes for bidisperse particulate suspension systemsB. Chun¹; J. Park¹; J. Yun¹; H. Jung*¹

1. Korea University, Chemical and Biological Engineering, Republic of Korea

(MCARE-P-025-2021) Development of non-precious metal passive NO_x adsorber based on layered double hydroxidesY. Choi*¹; K. Lee¹

1. Korea university, Department of Chemical and Biological Engineering, Republic of Korea

(MCARE-P-026-2021) Enhanced oxygen transport by PVPA contents at cathode of the high temperature proton exchange membrane fuel cellsE. Lee¹; D. Kim¹; C. Pak*¹

1. Gwangju Institute of Science and Technology, Republic of Korea

(MCARE-P-027-2021) Enhancement of catalytic activity and operation durability of biocatalyst by using thiol-maleimide cross linking bondY. Chung*¹; H. Jeon¹; J. Ji²; H. An¹; Y. Kwon²1. Korea National University of Transportation, Department of Chemical and Biological Engineering, Republic of Korea
2. Seoul National University of Science and Technology, Department of Chemical and Biomolecular Engineering, Republic of Korea**(MCARE-P-028-2021) Fabrication of Transdermal Delivery Enhanced Nanofiber patch (PMSEA-SA/PCL-MTA) for Wound Dressing**S. H. Choi*¹; S. Hong¹; K. Yoon¹

1. Hannam University, Chemistry, Republic of Korea

(MCARE-P-029-2021) Bimetallic metal organic frameworks mediated loading of Co and Fe catalysts on In₂O₃ nanofibers: Design of highly sensitive ethanol sensorsS. Lee*¹; T. Kim¹; Y. Jo¹; K. Kim¹; J. Lee¹

1. Korea University, Republic of Korea

EHS S4: Thermoelectric Energy Harvesting I (Joint with MCARE Symp 3)

Session Chair: Bed Poudel, Pennsylvania State University

12:30 PM**(EHS-005-2021) High Power Factor Versus High zT in Thermoelectric Materials and Generators (Invited)**A. Feldhoff*¹; M. Wolf¹; R. Hinterding¹

1. Leibniz University Hannover, Institute of Physical Chemistry and Electrochemistry, Germany

1:00 PM**(EHS-006-2021) Enhancement of thermoelectric performance in non-toxic CuInTe₂/SnTe coated grain nanocomposite**J. Hwang*¹; M. Lee¹; M. Han¹; S. Kim¹; S. Kim¹

1. Ewha Womans university, Chemistry, Republic of Korea

1:15 PM**(EHS-007-2021) Thermoelectric Cooling Technology in Electronics Heat Management**B. Poudel*¹; A. Nozariasbmarz¹; W. Li¹; H. Kang¹; H. Zhu¹; S. Priya¹

1. Pennsylvania State University, Department of Materials Science and Engineering, USA

1:30 PM**(EHS-008-2021) Bismuth Telluride/half-Heusler Segmented Thermoelectric Modules Provide Record 12% Conversion Efficiency**W. Li*¹; B. Poudel¹; R. Sriramdas¹; A. Nozariasbmarz¹; S. Priya¹

1. The Pennsylvania State University, Materials Science and Engineering, USA

1:45 PM**(EHS-009-2021) High Performance Thermoelectric Modules for Smart Buildings Sensors**A. Nozariasbmarz*¹; B. Poudel¹; W. Li¹; H. Kang¹; H. Zhu¹; S. Priya¹

1. Pennsylvania State University, Materials Science and Engineering, USA

EHS S4: Thermoelectric Energy Harvesting II (Joint with MCARE Symp 3)

Session Chair: Wenjie Li, The Pennsylvania State University

2:45 PM**(EHS-012-2021) Distributed Transport Properties: Expanded Seebeck Coefficient Range Enables Thermoelectrics With Superior Performance Without Higher ZT Materials (Invited)**D. Crane*¹; B. Madigan¹; L. Bell¹

1. DTP Thermoelectrics, LLC, USA

3:15 PM**(EHS-013-2021) High temperature performance of All-Oxide 2D Layered Thermoelectric Device Fabricated by Plasma Spray**F. R. Caliar*¹, S. Sampath¹

1. Stony Brook University, Center for Thermal Spray Research, USA

3:30 PM**(EHS-014-2021) Thermoelectric System Economics - The Apex: New Paradigms in Manufacturing and Interface Performance Driving System Cost Optimizations (Invited)**T. J. Hendricks*¹

1. NASA-Jet Propulsion Laboratory/California Institute of Technology, Propulsion, Thermal, & Materials Engineering, USA

4:00 PM**(EHS-015-2021) High performance thermoelectric device fabrication and their stability**B. Poudel*¹; A. Nozariasbmarz¹; W. Li¹; S. Priya¹

1. Pennsylvania State University, Department of Materials Science and Engineering, USA

4:15 PM

(EHS-017-2021) Oxidation Resistance of Half-Heusler Alloys for High Temperature Sustainable Thermoelectric Generators in AirH. Kang^{*1}; U. Saparamadu¹; A. Nozariasbmarz¹; W. Li¹; B. Poudel¹; H. Zhu¹; S. Priya¹

1. Pennsylvania State University, Materials Science and Engineering, USA

MCARE S5: Materials for Upconversion, Downconversion / Quantum Cutting, Luminescent Downshifting III

Session Chair: Jose Marques-Hueso, Heriot-Watt University

12:30 PM

(MCARE-045-2021) Amplifying the prospects of upconverting nanoparticles (Invited)J. Schuck^{*1}

1. Columbia University, USA

1:00 PM

(MCARE-046-2021) Using Eu³⁺ as a versatile probe for local and long-range chemistries (Invited)J. Dorman^{*1}

1. Louisiana State University, Chemical Engineering, USA

1:30 PM

(MCARE-047-2021) Luminescent Pyrochlore Metal Oxide NanoparticlesY. Mao^{*1}

1. Illinois Institute of Technology, Department of Chemistry, USA

1:45 PM

(MCARE-048-2021) Luminescent Solar Concentrators based on Quantum Dots and Carbon Dots (Invited)D. Benetti^{*1}; F. Rosei¹

1. Institut National de la Recherche Scientifique, Énergie Matériaux Télécommunications, Canada

MCARE S5: Multifunctional Spectral Conversion Materials: Applications Beyond the Energy Sector

Session Chair: Eva Hemmer, University of Ottawa

2:45 PM

(MCARE-049-2021) Porous SiC electroluminescence from p-i-n junction (Invited)A. Kitai^{*1}; S. Bawa¹; T. Zhang¹; L. Dow¹; S. Peter¹

1. McMaster University, Engineering Physics/Materials, Canada

3:15 PM

(MCARE-050-2021) Toward Biosourced Materials for Electrochemical Energy Storage: The Case of Melanin Biopigments and Tannins (Invited)C. Santato^{*1}

1. Ecole Polytechnique de Montreal, Canada

3:45 PM

(MCARE-051-2021) Exploration of Lanthanum Hafnate Pyrochlores for Radioactive Waste ContainmentY. Mao^{*1}

1. Illinois Institute of Technology, Department of Chemistry, USA

4:00 PM

(MCARE-052-2021) Persistent Luminescence properties of Doped Spinel Metal Oxide NanoparticlesY. Mao^{*1}

1. Illinois Institute of Technology, Department of Chemistry, USA

MCARE S16: Solar Energy Harvesting III

Session Chair: Feray Uenlue, University of Cologne

12:30 PM

(MCARE-053-2021) Single-Source Precursors for Controlled Gas Phase Deposition of Iridium-based Catalytic Coatings for Water Splitting ApplicationsM. Frank^{*1}; S. Mathur¹

1. University of Cologne, Inorganic Chemistry, Germany

12:45 PM

(MCARE-054-2021) Superhard Conductive Rhenium Nitride Thin Films via Magnetic Field-Assisted CVD from Volatile Rhenium PrecursorsZ. Aytuna^{*1}; M. Frank¹; S. Mathur¹

1. Institute of inorganic Chemistry, Department of Chemistry, Germany

1:00 PM

(MCARE-055-2021) Size-dependent properties of nanostructured metal oxides (Invited)P. Broqvist¹; J. Kullgren^{*1}

1. Uppsala University, Department of Chemistry-Ångström Laboratory, Sweden

1:30 PM

(MCARE-056-2021) Molecular Level Synthesis of InFeO₃ and InFeO₃/Fe₂O₃ NanocompositesV. Nahrstedt^{*1}; D. Stadler¹; T. Fischer¹; S. Mathur¹

1. University of Cologne, Germany

1:45 PM

(MCARE-057-2021) Limited Drift Distance of Photoexcited Minority Carrier in Surface Space Charge region (Invited)H. Choi^{*1}

1. University of Cologne, Germany

2:15 PM

(MCARE-058-2021) Enhancing charge delocalization and transport of metal halide perovskite quantum dots using conjugated molecular ligands (Invited)J. Z. Zhang^{*1}

1. University of California Santa Cruz, Chemistry and Biochemistry, USA

Wednesday, July 21, 2021**MCARE Plenary****Plenary Speaker 3**

Session Chair: Sanjay Mathur, University of Cologne

9:00 AM

Introduction

9:05 AM

(MCARE-PLEN-2021) Hybrid Perovskites - Materials Formation and ScalingE. Unger^{*1}

1. Helmholtz-Zentrum Berlin für Materialien und Energie, Germany

EHS S1: Materials, Components and Devices for Self-powered Electronics I

Session Chair: Junggho Ryu, Yeungnam University

10:00 AM

(EHS-018-2021) Precursor's thermodynamics for advanced MOCVD materialsA. Makarenko^{*1}; K. Zherikova¹

1. NIIC SB RAS, Russian Federation

10:15 AM

(EHS-019-2021) Electrically Engaged Undulation System for Hydrodynamic Energy HarvestingK. Lu*¹

1. Pyro-E, USA

10:30 AM

(EHS-020-2021) High-power density magnetic field harvester using a two-degree-of-freedom architectureR. Sriramdas*¹; R. Cruz²; M. Kang³; S. Priya¹

1. Pennsylvania State University, USA

10:45 AM

(EHS-021-2021) An Underwater Acoustic Transmitter Powered by Fish's Swimming MotionH. Li*¹; J. Lu¹; M. Myjak¹; S. Liss¹; R. Brown¹; Z. Deng¹; C. Tian²

1. Pacific Northwest National Laboratory, USA
2. Institute of Deep-sea Science and Engineering, Chinese Academy of Sciences, China

EHS S6: Special Symposium: European Energy Harvesting Workshop with Special Honor to Professor Pim W.A. Groen

Session Chairs: Grzegorz Litak, Lublin University of Technology; Yang Bai, University of Oulu

10:00 AM

(EHS-022-2021) A tribute to the work of the late Professor Pim Groen and his contribution to the field of electroceramics and their applications (Invited)S. van der Zwag*¹

1. Technical University of Delft, Faculty of Aerospace Engineering, Netherlands

10:30 AM

(EHS-023-2021) Celebrating the Intellectual and Technological Contributions of Pim Groen (Invited)C. Randall*¹

1. Penn State University, Materials Science and Engineering, USA

11:00 AM

(EHS-024-2021) Early conversations, energy harvesting using ZnO nanostructures (Invited)S. Dunn*¹

1. LSBU, Engineering, United Kingdom

11:30 AM

(EHS-025-2021) Piezoelectric materials and their role in energy harvesting - Celebrating Prof. Groen's contributions (Invited)S. Priya*¹

1. Pennsylvania State University, USA

MCARE S2: Advanced Materials for Energy Storage

Session Chair: Yu (Michael) Zhong, Worcester Polytechnic Institute

10:00 AM

(MCARE-059-2021) Synthesis of hcp Cobalt Nitrogen doped carbon catalyst through plasma engineering for Oxygen Reduction ReactionJ. Yoon*¹; S. Kim¹; O. H. Li¹

1. Pusan National University, Materials Science and Engineering, Republic of Korea

10:15 AM

(MCARE-060-2021) TiNb₂O₇ - a novel and fast-charging anode material for Li-ion batteriesM. Wilhelm*¹; S. Mathur¹

1. University of Cologne, Germany

10:30 AM

(MCARE-061-2021) A Flexible Free Standing Cathode from MgIn₂S₄ / Carbon Nanofibers for Magnesium Sulfur BatteriesR. Adam*¹; M. Wilhelm¹; S. Mathur¹

1. University of Cologne, Inorganic Chemistry, Germany

10:45 AM

(MCARE-062-2021) Bilayered NiZn(CO₃)(OH)₂-Ni₂(CO₃)(OH)₂ nanocomposites as positive electrode for supercapacitorsD. Lee*¹; S. Mathur¹

1. University of Cologne, Germany

11:00 AM

(MCARE-063-2021) Free-Standing Carbon Pellicles: Electrospinning Synthesis and Application as Anode for Sodium-Ion Battery (Invited)Y. Yue*¹; D. Austin¹

1. Delaware State University, Chemistry, USA

11:30 AM

(MCARE-064-2021) Mixed reduced and bronze-like Nb₂O₅ phases for hybrid supercapacitor applicationsF. R. Caliar*¹; J.T. Matshushima²; V. Rodrigues²; F. Miranda³; M. Balcan²; S. Sampath¹

1. Stony Brook University, Center for Thermal Spray Research, USA
2. National Institute of Space Research, Brazil
3. Technological Institute of Aeronautics, Brazil

MCARE S5: Development and Synthesis of Novel Optical Materials I

Session Chair: Jose Marques-Hueso, Heriot-Watt University

10:00 AM

(MCARE-065-2021) Formation pathway model of Colloidal Semiconductor Compound Magic-Size Clusters and Quantum Dots (Invited)K. Yu*¹

1. Sichuan University, National Engineering Research Center for Biomaterials, China

10:30 AM

(MCARE-066-2021) Anisotropic perovskite nanocrystals, engineering materials for light manipulation and conversion at the atomic level (Invited)Y. Bekenstein*¹

1. Technion - Israel Institute of Technology, Material Science and Engineering, Israel

11:00 AM

(MCARE-067-2021) Interfacial properties in composite nano-systems for energy harvesting (Invited)A. Vomiero*¹

1. Lulea University of Technology, Engineering Sciences & Mathematics, Sweden

11:30 AM

(MCARE-068-2021) Nano-crystalline ZnO:Eu sponges; nature of Ln doping (Invited)G. Westin*¹

1. Uppsala University, Sweden

MCARE S15: Advances in Fundamental Science and Development of Photovoltaic Materials and Devices

Session Chairs: Daniele Benetti, Institut National de la Recherche Scientifique; Kelsey Stoerzinger, Oregon State University

10:00 AM

(MCARE-069-2021) Singlet-Fission Solar Cells: Why So Hard? (Invited)O. G. Reid*¹; N. A. Pace²; G. Rumbles²; J. C. Johnson²

1. University of Colorado Boulder, Renewable and Sustainable Energy Institute, USA
2. National Renewable Energy Laboratory, Chemistry and Nanoscience, USA

10:30 AM

(MCARE-070-2021) New Sulfides Photoabsorbers by Combining Experiment and Theory (Invited)A. Crovetto*¹

1. Helmholtz Zentrum Berlin, Germany, Germany

11:00 AM

(MCARE-071-2021) Ionic compounds enable efficient and durable perovskite photovoltaics (Invited)Y. Lin*¹

1. University of Oxford, Physics, United Kingdom

Poster Session 2A (live presentations) also available in on-demand session

1:00 PM

(EHS-P-003-2021) Semi-analytic finite element method applied to short fiber-reinforced piezoelectric compositeL. E. Barraza de Leon¹; H. Camacho Montes*¹; Y. Espinosa Almeyda²; J. A. Otero Hernández²; R. Rodríguez Ramoms³; J. C. Lopez Realpozo³; F. J. Sabina Cisca²

1. Universidad Autonoma de Ciudad Juarez, Physics and Mathematics, Mexico
2. Universidad Nacional Autonoma de Mexico, Matematica y Mecanica, Mexico
3. Instituto Tecnológico de Estudios Superiores de Monterrey, Física y Mecánica, Mexico
4. Universidad de La Habana, Mecánica, Cuba

(MCARE-P-030-2021) Dipole engineering of BaTiO₃ ceramics using [Mn²⁺, W⁶⁺]W. D. Senn*¹; W. J. Hogan¹; N. Betancur-Granados²; K. Ning¹; J. I. Tobón³; O. J. Restrepo³; H. Shulman¹; S. M. Pilgrim¹; W. A. Schulze¹; S. Tidrow¹

1. Alfred University, New York State College of Ceramics, School of Engineering, USA
2. Alfred University/Universidad Nacional de Colombia, USA
3. Universidad Nacional de Colombia, Materials and Minerals Department, Cambodia

(MCARE-P-031-2021) Electric and Dielectric Behaviors of [In, Ta] Dipole Pair Substituted BaTiO₃ CeramicsE. Merkey*¹; I. Chedzoy¹; N. Betancur-Granados²; K. Ning¹; J. I. Tobón³; O. J. Restrepo³; H. Shulman¹; S. M. Pilgrim¹; W. A. Schulze¹; S. Tidrow¹

1. Alfred University, New York State College of Ceramics, School of Engineering, USA
2. Alfred University/Universidad Nacional de Colombia, USA
3. Universidad Nacional de Colombia, Materials and Minerals Department, Cambodia

(MCARE-P-033-2021) Capacitive Thermoelectric Device Based on Dipole Engineered CeramicsK. Ning*¹; H. Shulman¹; S. M. Pilgrim¹; W. A. Schulze¹; S. Tidrow¹

1. Alfred University, New York State College of Ceramics, School of Engineering, USA

(MCARE-P-034-2021) A Novel Photoanode with Hierarchical Forest-Like TiO₂ Structure with Plasmonic Nanoparticles for Flexible Dye Sensitized Solar CellsB. Choudhury*¹; C. Lin¹; S. Shawon¹; M. Uddin¹

1. University of Texas Rio Grande Valley, Chemistry, USA

(MCARE-P-035-2021) A Fiber Shaped Dye Sensitized Solar Cell with a Liquid Polysulfide Electrolyte Showing High Open Circuit Voltage and Photon Conversion EfficiencyB. Choudhury*¹; G. Grissom¹; M. Uddin¹

1. University of Texas Rio Grande Valley, Chemistry, USA

(MCARE-P-036-2021) Colour tuneability in rare-earth doped sol-gel nano-glass-ceramics for anti-counterfeiting luminescent stamps: an encoded lightkeyS. Torres-García*¹; J. Méndez-Ramos¹; P. Acosta-Mora¹; A. Yanes¹; J. del-Castillo¹; C. Hernández-Alvarez¹; M. Medina-Alayón¹; A. Menéndez-Velázquez²

1. Universidad de La Laguna, Spain
2. Centro IDONIAL, Spain

Poster Session 2B (live presentations) also available in on-demand session

1:30 PM

(MCARE-P-037-2021) TESTEC: PET and NBR based Cost Effective and Self-sustainable Triboelectric Energy Case for Powering Smart Electronic DevicesA. Flores*¹; A. Abdullah¹; A. Chowdhury¹

1. University of Texas Rio Grande Valley, Science Department, USA

(MCARE-P-038-2021) Hybrid Triboelectric-Electromagnetic Nanogenerator for Energy ScavengingE. Islam²; A. Chowdhury¹; F. Tasnim*¹; A. Abdullah¹; M. Martinez²; C. Olivares¹; K. Lozano²; M. Uddin¹

1. University of Texas Rio Grande Valley, Chemistry, USA
2. University of Texas Rio Grande Valley, Mechanical Engineering, USA
3. University of Texas Rio Grande Valley, The Mathematics and Science Academy, USA

(MCARE-P-039-2021) Novel Dipole-Pair [Zn, W] Substituted BaTiO₃ CeramicsT. L. Whaley*¹; N. T. Smith¹; V. R. Pellegrin¹; K. Ning¹; H. Shulman¹; S. M. Pilgrim¹; W. A. Schulze¹; S. Tidrow¹

1. Alfred University, New York State College of Ceramics, School of Engineering, USA

(MCARE-P-040-2021) Electric and Dielectric Behavior of the [Y, Ta] Dipole Engineered BaTiO₃ CeramicsV. R. Pellegrin*¹; W. J. Hogan¹; W. D. Senn¹; K. Ning¹; H. Shulman¹; S. M. Pilgrim¹; W. A. Schulze¹; S. Tidrow¹

1. Alfred University, New York State College of Ceramics, School of Engineering, USA

(MCARE-P-041-2021) Surface modified ZnSnO₃ nanocubes for enhanced piezoelectric power generation and sensory applicationS. Shawon*¹

1. The University of Texas Rio Grande Valley, Chemistry, USA

(MCARE-P-042-2021) Emission Characteristics of Compression Ignition (CI) Engines Running on Waste Cooking Oil Based Biodiesel-nano Additive BlendsS. K. Fasogbon*¹; A. J. Apata¹

1. University of Ibadan, Mechanical Engineering, Nigeria

(MCARE-P-043-2021) Fabrication of a Highly Sensitive Touchless Triboelectric Motion Sensor for Motion Sensing and Movement Monitoring OperationsD. L. Zamora*¹; A. Abdullah¹; A. Chowdhury¹; A. Flores¹

1. University of Texas Rio Grande Valley, Chemistry, USA

EHS S3: Multi-functional Energy Conversion Materials and Devices for Energy Harvesting and/or Sensing I

Session Chairs: Yang Bai, University of Oulu; Chris Bowen, University of Bath

2:15 PM

(EHS-026-2021) Core@shell nanoarchitectures as building blocks for single and hybrid energy harvesters (Invited)X. Garcia-Casas¹; J. Castillo-Seoane¹; N. Filippin¹; F. Aparicio¹; A. Ghaffarinejad¹; L. Contreras-Bernal¹; J. Budagoski¹; C. Lopez-Santos¹; A. Barranco¹; J. Sánchez-Valencia¹; A. Borrás*¹

1. Materials Science Institute of Seville / Spanish National Scientific Council CSIC, Nanotechnology on Surfaces and Plasma Laboratory, Spain

2:45 PM

(EHS-027-2021) Removing the need for a domain boundary in efficient photoexcited charge carrier separation (Invited)S. Dunn*¹; Y. Wang²; M. Zhang²; J. Liu³; H. Zhang⁴; F. Li⁵; C. Tseng⁶; B. Yang⁷; G. Smith⁷; J. Zhai⁵; Z. Zhang⁶; H. Yan²

1. London South Bank University, Chemical and Energy Engineering, United Kingdom
2. QMUL, SEMS, United Kingdom
3. Tsinghua University, Beijing, China, School of Environment, China
4. China Academy of Engineering Physics, IRTAC, China
5. Tongji University, Functional Materials Research Laboratory, China
6. Uppsala University, Solid State Electronics, Sweden
7. University of Chester, Faculty of Science and Engineering, United Kingdom

3:15 PM**(EHS-028-2021) Analysis and Experimental Results of Metamaterial for Vibration Energy Harvesting (Invited)**Z. Hadas*¹

1. Brno University of Technology, Faculty of Mechanical Engineering, Czechia

3:45 PM**(EHS-029-2021) Modified Zinc Oxide Nanorods in Functional Polymer for Piezoelectric Energy Harvesting and Motion Sensing**M. Sadaf*¹; H. Majumder¹; A. Abdullah²; M. Uddin¹

1. University of Texas Rio Grande Valley, Chemistry, USA
2. University of Texas Rio Grande Valley, USA

4:00 PM**(EHS-030-2021) Emerging halide perovskites with ultralow thermal conductivity for thermoelectric applications**L. Zheng*¹; A. Nozariasbmarz¹; K. Wang¹; B. Poudel¹; S. Priya¹

1. Penn State University, Materials Science and Engineering, USA

4:15 PM**(EHS-031-2021) Relaxor-ferroelectrics: An efficient material for waste-heat harvesting**A. Sharma*¹; M. Behera¹; S. Pradhan¹; M. Bahoura¹

1. Norfolk State University, Materials Science, USA

4:30 PM**(EHS-032-2021) Low Grade Waste Heat Recovery Using Shape Memory Alloys**N. Liu*¹; B. Poudel¹; R. LaSalle¹; S. Priya¹

1. penn state university, Materials Science and Engineering, USA

MCARE S5: Development and Synthesis of Novel Optical Materials II

Session Chair: Yuanbing Mao, Illinois Institute of Technology

2:15 PM**(MCARE-073-2021) Influence of Growth and Processing Conditions on the Properties of Si-C-N:H Thin Film Structures (Invited)**A. Abdelal¹; Z. Khatami²; P. Mascher*¹

1. McMaster University, Engineering Physics, Canada
2. University of New Brunswick, Canada

2:45 PM**(MCARE-074-2021) Low-power upconverting nanoparticle microlasers (Invited)**E. Chan*¹

1. Lawrence Berkeley National Laboratory, The Molecular Foundry, USA

3:15 PM**(MCARE-075-2021) Novel Properties of Metal Halide Perovskites: From Quantum Dots to Magic Sized Clusters and Molecular Clusters (Invited)**J. Z. Zhang*¹

1. University of California Santa Cruz, Chemistry and Biochemistry, USA

MCARE S15: Materials and Devices for Energy Production and Storage

Session Chair: Kelsey Stoerzinger, Oregon State University

2:15 PM**(MCARE-076-2021) Light-driven control of ultrafast H-atom abstraction reactions (Invited)**C. W. Schlenker*¹

1. University of Washington, Chemistry, USA

2:45 PM**(MCARE-077-2021) Energetic Cost for Being "Redox-Site-Rich" Nickel-Aluminum Layered Double Hydroxide Pseudocapacitive Materials (Invited)**D. Wu*¹; X. Zhang¹; C. Cockreham¹

1. Washington State University, Alexandra Navrotsky Institute for Experimental Thermodynamics, USA

3:15 PM**(MCARE-078-2021) Energy Storage in Permanently Porous Polymorphs of Metal Chalcogenides (Invited)**C. K. Brozek*¹

1. University of Oregon, Chemistry and Biochemistry, USA

3:45 PM**(MCARE-079-2021) Novel radical conjugated polymer with high electrical conductivity for thermoelectric applications (Invited)**E. Orgiu*¹

1. Institut National de la Recherche Scientifique (INRS), EMT Centre, Canada

4:15 PM**(MCARE-080-2021) Atomistic Engineering of the Energy Materials of the Future (Invited)**S. R. Spurgeon*¹

1. Pacific Northwest National Laboratory, Energy and Environment Directorate, USA

4:45 PM**(MCARE-081-2021) Solvent-Based Synthesis and Integration of Nanostructured Alloying Electrode Materials with Controlled Surface Chemistry and Morphology (Invited)**V. C. Holmberg*¹

1. University of Washington, Chemical Engineering, USA

5:15 PM**(MCARE-082-2021) 3D Lithium-ion Battery Architectures – From Design to Fabrication (Invited)**C. L. Cobb*¹

1. University of Washington, Department of Mechanical Engineering, USA

Thursday, July 22, 2021**EHS S3: Multi-functional Energy Conversion Materials and Devices for Energy Harvesting and/or Sensing II**

Session Chairs: Chris Bowen, University of Bath; Steven Dunn, LSBU

9:00 AM**(EHS-033-2021) Organic and organic-inorganic hybrid ferroelectric materials for piezoelectric energy harvesting applications (Invited)**R. Boomi Shankar*¹

1. Indian Institute of Science Education and Research, Pune, Department of Chemistry and Centre for Energy Science, India

9:30 AM**(EHS-034-2021) Porous piezoelectric particulate composites, processing, characterisation and modelling (Invited)**H. Khanbareh*¹; S. E. van Kempen²; K. de Boom³

1. University of Bath, Mechanical Engineering, United Kingdom
2. RWTH Aachen, Germany
3. Delft University of Technology, Netherlands

10:00 AM**(EHS-035-2021) MOF Derived Fiber Nanogenerator for Efficient Acoustoelectric Energy Conversion (Invited)**D. Mandal*¹

1. Institute of Nano Science and Technology, QMaD, India

10:30 AM**(EHS-036-2021) Li and Ta modified KNN nanofibers for vibrational energy harvesting applications**

A. Ichangji^{*}; S. V. Vladimir²; D. C. Lupascu²; K. Lê³; M. Grosch¹; A. K. Schmidt-Verma¹; C. Bohr¹; A. Verma¹; T. Fischer¹; S. Mathur¹

1. University of Cologne, Inorganic Chemistry, Germany
2. Institute for Materials Science and Center for Nanointegration Duisburg-Essen, Germany

10:45 AM**(EHS-037-2021) Opto-electric, opto-mechanical and opto-thermo-electric control of ferroelectric domains for multi-source energy harvesting and sensing**

Y. Bai^{*}; G. Vats²; J. Seidel²; J. Juuti¹

1. University of Oulu, Finland
2. KU Leuven, Belgium
3. UNSW Sydney, Australia

MCARE S5: Plasmonic / Photonic Manipulation of Conversion Processes I

Session Chair: Eva Hemmer, University of Ottawa

9:00 AM**(MCARE-076-2021) A Multi-functional Highly Efficient Upconversion Luminescent Film (Invited)**

D. Ko^{*}

1. Kyung Hee University, Applied Chemistry, Republic of Korea

9:30 AM**(MCARE-077-2021) Omnidirectional, Broadband Light Absorber with High Aspect Ratio (AR) Nanoturf structures for Solar-Thermal Conversion**

J. Kim^{*}; T. Kim¹

1. Sungkyunkwan University, School of Chemical Engineering, Republic of Korea

9:45 AM**(MCARE-078-2021) Addressing Plasmonic Catalysis with Designer Nanoparticles (Invited)**

P. Camargo^{*}

1. University of Helsinki, Finland

10:15 AM**(MCARE-079-2021) Optical Field Coupling in ZnO Nanorods Decorated with Silver Nanoparticles**

M. Gilzad Kohan^{*}; A. Camellini²; S. You¹; A. Vomiero¹; I. Concina¹; M. Zavelani-Rossi²

1. Lulea university of technology, engineering sciences and mathematics, Sweden
2. Politecnico di Milano, Italy

MCARE S5: Plasmonic / Photonic Manipulation of Conversion Processes II

Session Chair: Eva Hemmer, University of Ottawa

10:45 AM**(MCARE-080-2021) Near-infrared driven photocatalysis for extending spectral response of water-splitting semiconductor electrodes: Up-conversion, what else? (Invited)**

J. Méndez-Ramos^{*}; P. Acosta-Mora¹; J. del-Castillo¹; A. Yanes¹; S. Torres-García¹; C. Hernández-Alvarez¹; M. Medina-Alayón¹; A. Menéndez-Velázquez²; N. Khaidukov²

1. Universidad de La Laguna, Departamento de Física, Spain
2. Russian Academy of Sciences, Russian Federation
3. Centro IDONIAL, Spain

11:15 AM**(MCARE-081-2021) Catalysts for Water splitting: 2D layered materials and transition metal phosphides (Invited)**

T. A. Shifa^{*}; A. Vomiero¹

1. Lulea University of Technology, Experimental physics, Sweden

11:45 AM**(MCARE-082-2021) Catalyst synthesis and characterization for electrochemical water splitting**

G. Solomon^{*}; M. Gilzad Kohan¹; R. Mazzaro²; M. Vagin²; F. Rigoni³; M. M. Natile⁴; A. Landström¹; S. You¹; M. Jugovac²; V. Morandi²; P. Moras²; E. Cattaruzza³; I. Concina¹; A. Vomiero¹

1. Luleå University of Technology, Department of Engineering Science and Mathematics, Sweden
2. Department of Science and Technology, Laboratory of Organic Electronics, Linköping University, Sweden
3. Department of Molecular Sciences and Nanosystems, Ca'Foscari University of Venice, Italy
4. Institute of Condensed Matter Chemistry and Technologies for Energy (ICMATE), National Research Council (CNR) and Department of Chemical Sciences, University of Padova, Italy
5. Istituto di Struttura della Materia-CNR (ISM-CNR), Italy
6. CNR-Institute of Microelectronics and Microsystem (IMM), Section of Bologna Via Piero Gobetti 101, Italy

MCARE S6: Materials, Components and Devices for Self-powered Electronics II

Session Chair: Miso Kim, Sungkyunkwan University

9:00 AM**(MCARE-083-2021) Enhancement of energy conversion efficiency achieved of magneto-mechano-electric generators by optimization of interfacial layer**

S. Kim^{*}; A. Thakre¹; D. Patil¹; G. Hwang²; J. Ryu¹

1. Yeungnam university, Materials science and engineering, Republic of Korea
2. Pukyong National university, Republic of Korea

9:15 AM**(MCARE-085-2021) Improved Energy Harvesting Performance of Magneto-Mechano-Electric Generator with Permeability Variation of Magnetic Flux Concentrator**

H. Choi^{*}; A. Thakre¹; J. Ryu¹

1. Yeungnam University, Gyeongsan, Korea (the Republic of), School of Materials Science and Engineering, Republic of Korea

9:30 AM**(MCARE-086-2021) Study of energy harvesting performance of magneto-mechano-electric generator with aspect ratio variation of piezoelectric constituents**

A. Kumar^{*}; S. Park¹; D. Patil¹; G. Hwang²; J. Ryu¹

1. Yeungnam University, School of Materials Science & Engineering, Republic of Korea
2. Pukyong National University, Department of Materials Science and Engineering, Republic of Korea

9:45 AM**(MCARE-087-2021) Enhancement of output power of magneto-mechano-electric generator by optimizing the magnet proof mass position with magnetic flux concentrator**

D. Patil^{*}; J. Ryu¹

1. Yeungnam University, Materials Science and Engineering, Republic of Korea

10:00 AM**(MCARE-090-2021) Biomaterial-Based Energy Harvesting Sensors for Structural Health Monitoring**

F. Okosun^{*}; S. Guerin²; V. Pakrashi¹

1. University College Dublin, Mechanical Engineering, Ireland
2. University of Limerick, Bernal Institute, Ireland

10:15 AM**(MCARE-091-2021) Electronic Structure of Nano-crystalline Soft Magnetic Materials for Energy Storage and Conversion**

M. Choi^{*}; Y. Hong¹; H. Won¹; W. Lee²; S. Kim³

1. The University of Alabama, Electrical and Computer Engineering, USA
2. Samsung Electro-Mechanics, RF Product Development Group, Republic of Korea
3. Mississippi State University, Department of Physics & Astronomy and Center for Computational Sciences, USA

10:30 AM**Break**

10:45 AM**(MCARE-092-2021) Novel Ferroelectric Ceramics through [Ga, Ta] Dipole Engineering**K. Ning*; H. Shulman; S. M. Pilgrim; W. A. Schulze; S. Tidrow¹

1. Alfred University, New York State College of Ceramics, School of Engineering, USA

11:00 AM**(MCARE-093-2021) Design of High Power Magnetoelectric Transducers for Wireless Power Transmission**R. Sriramadas; S. S. Hosur*; S. K. Karan; M. Kiani; S. Priya¹

1. Pennsylvania State University, USA

MCARE S9: Critical Materials for Energy

Session Chair: Nobuhito Imanaka, Osaka University

9:00 AM**(MCARE-094-2021) Recovery and recasting of used perfluorosulfonic membrane in vanadium flow battery by ion exchange resin**W. Chen; Y. Chen*; C. Lee; S. Mesaki; Y. Chen¹

1. National Cheng-Kung University, Resource engineering, Taiwan

9:15 AM**(MCARE-095-2021) Synthesis of copper, indium, and gallium oxides from waste thin-film solar panels**F. Liu*; T. Cheng; Y. J. Chen; C. Lai; W. Chen; Y. Chueh¹1. National Tsing Hua University, Department of Materials Science and Engineering, Taiwan
2. National Cheng Kung University, Department of Resources Engineering, Taiwan**9:30 AM****(MCARE-096-2021) Investigation on ferro/anti-ferro coupling and magnetic moment by substitution of RE (RE=Pr, Tb, Dy) for Nd in Nd₂Fe₁₄B crystal**D. Kim*; S. Kim; V. Galkin; R. Kuchi¹

1. Korea Institute of Materials Science, Republic of Korea

9:45 AM**(MCARE-097-2021) Separation of valuable metal from waste tin anode slime by solvent extraction after oxidation leaching**W. Chen; S. Mesaki*; C. Lee; Y. Chen; Y. Chen¹

1. National Cheng-Kung University, Resource Engineering, Taiwan

10:00 AM**(MCARE-098-2021) Optimization of bulk crystal growth method for improved performance and yield of CdTe for solar and detector applications**S. Swain*; S. Kakkireni; J. McCloy¹

1. Washington State University, USA

MCARE S8: Advanced Materials for Fuel Cells and High Temperature Electrolysis

Session Chair: Yongchai Kwon, Seoul National University of Science and Technology

10:50 AM**(MCARE-099-2021) Tuning 3-Dimensional Nanoarchitectures for More Efficient Energy Conversion via High-resolution Printing (Invited)**

Y. Jung*

1. KAIST, Dept. of Materials Science and Engineering, Republic of Korea

11:20 AM**(MCARE-100-2021) Improvement of Durability of the Cathode under Start-up/Shut-down process with IrRuOx/C catalyst in Polymer Electrolyte Membrane Fuel Cell**

M. Min; E. You; S. Lee; C. Pak*

1. Gwangju Institute of Science and Technology, Graduate Program of Energy Technology, Republic of Korea
2. Samsung SDI, Fuel Cell Group, Republic of Korea
3. Hyundai Mobis Co., Fuel Cell Engineering Group, Republic of Korea**11:35 AM****(MCARE-101-2021) Synthesis of high dispersed FeNC single atom oxygen reduction reaction catalyst using solution plasma process**

H. Son*

1. Pusan National University, Republic of Korea

11:50 AM**(MCARE-103-2021) A Novel Vanadia Doped YSZ Ceramic for Solid Oxide Cell Applications**J. Drazin*; D. McLarty¹

1. WSU, MME, USA

MCARE S10: Lifecycle Impacts of Clean Energy Materials

Session Chair: Gabrielle Gaustad, NYS College of Ceramics, Alfred University

10:20 AM**(MCARE-104-2021) Processes for separating photovoltaic modules (crystalline-Si and CIGS) layer by layer**W. Chen; Y. Chen*; Y. Chen; F. Liu; C. Lee; S. Mesaki¹1. National Cheng-Kung University, Resource Engineering, Taiwan
2. National Tsing Hua University, Material Science, Taiwan**MCARE 14: Chemical and Biological Sensors**

Session Chairs: Praveen Sekhar, Washington State University, Vancouver; Sanjay Mathur, University of Cologne

9:00 AM**(MCARE-106-2021) Reactive Oxygen Species Scavenging and Improvement Effect of Inflammatory Disease Treatment by Functionalized Nanoparticles**S. Hong*; J. An; H. Hong; O. Kim; S. Yoon; S. Kim; K. Yoon¹1. Hannam University, Chemistry, Republic of Korea
2. Konyang University, Internal Medicine, Republic of Korea
3. Catholic University, Surgery, Republic of Korea**9:15 AM****(MCARE-107-2021) 2D metal-organic framework derived co-loading of Co₃O₄ and PdO nanocatalysts on In₂O₃ hollow spheres for high performance breath acetone sensors**Y. Jo*; K. Lim; J. Yoon; J. Lee¹

1. Department of Materials Science and Engineering, Korea University, Seoul 02841, Republic of Korea, Republic of Korea

9:30 AM**(MCARE-108-2021) Dual-mode gas sensors using Nb-doped NiO hollow spheres for highly selective and sensitive detection of xylene and toluene**T. Kim; Y. Jo*; S. Jeong; Y. Moon; J. Lee¹

1. Korea university, Republic of Korea

9:45 AM**(MCARE-109-2021) Bilayer Gas Sensors Composed of Metal Oxide Sensing Layer and Au Nanoparticle Catalytic Overlayer: Highly Tunable Gas Sensing Characteristics**Y. Moon*; S. Jeong; Y. Kang; J. Lee¹

1. Korea University, Materials Science and Engineering, Republic of Korea

10:00 AM**(MCARE-110-2021) Gas-Sensing Nanoreactors using Au@SnO₂ and SnO₂@Au Hollow Spheres: Tunable Gas Selectivity**S. Park*; S. Jeong; J. Yoon; J. Lee¹1. Korea University, Department of Materials Science and Engineering, Republic of Korea
2. Jeonbuk National University, Department of Information Materials Engineering, Republic of Korea**10:15 AM****(MCARE-111-2021) VOC-sensing properties of semiconductor-type gas sensors: Effects of CuO loading onto porous SnO₂**S. Torai*; T. Ueda; K. Kamada; T. Hyodo; Y. Shimizu¹

1. Nagasaki University, Graduate School of Engineering, Japan

10:30 AM

Break

10:45 AM

(MCARE-112-2021) Toluene-sensing properties of yttria-stabilized zirconia-based gas sensors attached with thin CeO₂-added Au sensing electrodesS. Kamura*; T. Ueda¹; K. Kamada¹; T. Hyodo¹; Y. Shimizu¹

1. Nagasaki University, Graduate School of Engineering, Japan

11:00 AM

(MCARE-113-2021) Rational design of oxide chemiresistors for exclusive detection of plant hormone ethylene: Tailoring gas selectivity by nanoscale catalytic overlayerS. Jeong*; Y. Moon¹; T. Kim¹; S. Park¹; K. Kim¹; Y. Kang¹; J. Lee¹

1. Korea University, Materials Science and Engineering, Republic of Korea

11:15 AM

(MCARE-114-2021) Hybrid structures of F-MWCNT/ZnO Nanocomposites for Ammonium Sensing ApplicationsN. K. S K¹; A. K. Aliyana*; A. Baburaj¹; M. Adetunji²; R. E. Fernandez²1. Mangalore University, Electronics, India
2. Norfolk State University, USA

11:30 AM

(MCARE-115-2021) Direct Integration of Surface Decorated Metal Oxide Nanowire Networks and Porous Nanofiber Meshes for Selective Gas DetectionD. Graf*; I. Gessner¹; S. Mathur¹

1. Institute of Inorganic chemistry, Chemistry, Germany

11:45 AM

(MCARE-116-2021) Electrochemical Ammonia Sensor on a Flexible SubstrateP. Sekhar*; D. Graf; O. Ojerle²; S. Mathur²1. Washington State University, Vancouver, Dept. of Engineering and Computer Science, USA
2. University of Cologne, Germany**EHS S2: Integrated Energy Harvesting and Storage Systems for Wearables and IoT**

Session Chair: Yang Bai, University of Oulu

11:15 AM

(EHS-038-2021) Towards the realization of greener electroactive transducers (Invited)

S. Graziani*

1. University of Catania, DIEI, Italy

11:45 AM

(EHS-039-2021) Inductor-less adaptive impedance matching with ultra-low power consumption for piezoelectric energy harvestingH. Jung*; K. Lu¹

1. Pyro-E, LLC, USA

MCARE S4: Advanced Materials for Perovskite and Next Generation Solar Cells

Session Chair: Guozhong Cao, University of Washington

12:20 PM

(MCARE-117-2021) Electrospun Hybrid Perovskite Fibers – Flexible Networks of One-Dimensional Semiconductors for Light Harvesting ApplicationsC. Bohr*; M. Pfeiffer¹; S. Öz¹; F. von Toperczer¹; A. Lepcha¹; T. Fischer¹; M. Schütz¹; K. Lindfors¹; S. Mathur¹

1. University of Cologne, Germany

MCARE S5: Lanthanides, Dyes and Quantum Confined Nanomaterials for Photovoltaic Applications

Session Chair: Eva Hemmer, University of Ottawa

1:00 PM

(MCARE-118-2021) Improving the performance of luminescent solar concentrators: Squeezing the sun (Invited)A. Menéndez-Velázquez*; J. Méndez-Ramos²; A. García-Delgado¹; M. Morales-Sabugal¹; P. Acosta-Mora²; J. del-Castillo²; S. Torres-García²; C. Hernández-Álvarez²; M. Medina-Alayón²; Á. Yanes²1. IDONIAL Technology Center, Photoactive Materials Research Unit, Spain
2. Universidad de La Laguna, Departamento de Física, Spain

1:30 PM

(MCARE-119-2021) Tuning the optoelectronic properties in composite systems for solar energy harvesting (Invited)

S. You*

1. Division of Materials Science, Department of Engineering Sciences and Mathematics, Sweden

2:00 PM

(MCARE-120-2021) New organic-inorganic hybrids towards broad band photocatalysis (Invited)

S. J. Ribeiro*

1. São Paulo State University- UNESP, Institute of Chemistry, Brazil

2:30 PM

(MCARE-121-2021) Metal Organic Frameworks for Photocatalysis and Photoelectrocatalysis (Invited)

N. Wu*

1. University of Massachusetts Amherst, USA

MCARE S11: Materials for Super Ultra-low Energy and Emission Vehicles

Session Chair: Kwan-Young Lee, Korea University

2:00 PM

(MCARE-122-2021) Designing Catalysts for Meeting the DOE 150 °C Challenge for Exhaust Emissions (Invited)

A. K. Datye*

1. University of New Mexico, Chemical & Biological Engineering, USA

2:30 PM

(MCARE-123-2021) Role of Ag/CeO₂-MnO_x catalysts in NO_x-assisted soot oxidationE. Lee*; M. Kim¹; J. Lee¹; K. Lee¹

1. Korea University, Republic of Korea

2:45 PM

(MCARE-124-2021) Morphology engineering of Cu-doped CeO₂ for increased support reducibility and Pd dispersion to achieve a highly efficient water-gas shift reactionM. Jang*; S. Yoon²; D. Shin¹; K. Lee³; K. An²; J. Han¹1. POSTECH, Department of chemical engineering, Republic of Korea
2. UNIST, School of energy and chemical engineering, Republic of Korea
3. Pohang Accelerator Laboratory (PAL), POSTECH, Republic of Korea

3:00 PM

(MCARE-125-2021) One-Dimensional Modelling of a Three-Way Catalytic ConverterS. Lim*; S. Bae¹; S. Choi²; J. Cho²; J. Lee¹1. Seoul National University, Chemical and Biological Engineering, Republic of Korea
2. Hyundai Motor Company, Exhaust Emission Catalyst Development Team, Republic of Korea

3:15 PM

(MCARE-126-2021) Low temperature challenge in diesel emission abatement: NH₃ selective catalytic reduction of NO and passive NO_x adsorbers (Invited)

J. Szanyi*

1. Pacific Northwest National Laboratory, Institute for Integrated Catalysis, USA

3:45 PM**(MCARE-127-2021) Development of Adsorbents for Lean NOx Trap and Passive NOx Adsorber**H. Kim¹; Y. Choi¹; K. Lee*¹

1. Korea University, Department of Chemical and Biological Engineering, Republic of Korea

4:00 PM**(MCARE-128-2021) Hydrocarbon removal in cold start period using Cu-impregnated MFI zeolite**J. Shim*¹; J. Choi¹

1. Korea University, Republic of Korea

4:15 PM**(MCARE-129-2021) Relationship between mobility and activity of Cu ion species in the Cu-SSZ-13 for selective catalytic reduction**H. Lee*¹; I. Song¹; s. Jeon¹; D. Kim¹

1. Seoul national university, Chemical and biological engineering, Republic of Korea

4:30 PM**(MCARE-130-2021) Improvement of surface properties of various metal substituted hexaaluminate catalyst for removing saturated hydrocarbons from automobile**S. Park¹; K. Sin²; K. Lee³; S. Cho*²

1. Korea University, Super Ultra Low Energy & Emission Vehicle Center, Republic of Korea
2. Chonnam National University, Chemical Engineering, Republic of Korea
3. Korea University, Chemical and Biological Engineering, Republic of Korea

MCARE S13: Theory and Experiment Meeting in Energy Materials Research

Session Chair: Heechae Choi, University of Cologne

1:00 PM**(MCARE-131-2021) Electric Field Assisted Sintering of Gadolinium-doped Ceria (GDC) (Invited)**T. Mishra*¹; O. Guillon¹; M. Bram¹

1. Institute of Energy and Climate Research IEK-1: Materials Synthesis and Processing, Forschungszentrum Jülich GmbH, Germany

1:30 PM**(MCARE-132-2021) Theoretical approach to the photochemical reactions on semiconductor surfaces**H. Choi*¹

1. University of Cologne, Germany

1:45 PM**(MCARE-133-2021) Design and optimization of CuSb_{1-x}Bi_xS₂ alloy as a promising photovoltaic material: Theoretical and experimental study**M. Je*¹; H. Choi¹

1. University of Cologne, Theoretical Materials & Chemistry Group, Germany

2:00 PM**(MCARE-134-2021) Fermi-level dependent catalytic activity of semiconductor**S. Ji*¹; H. Choi¹

1. University of Cologne, Theoretical Materials & Chemistry Group, Germany

Closing Ceremony

Session Chair: Eva Hemmer, University of Ottawa

5:00 PM**Announcement of 2022 meeting location; announcement of poster awards**