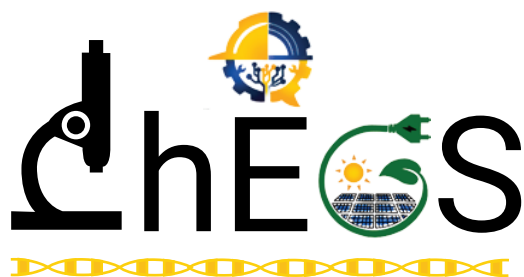


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GRADUATE RESEARCH SYMPOSIUM

*CELEBRATING
125 YEARS
OF MICHIGAN
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PROGRAM SCHEDULE

THURSDAY, SEPTEMBER 21, 2023

8:20 - 9:00 A.M.	Registration and Breakfast
9:00 - 10:20 A.M.	Oral Presentation Session 1
10:40 - 12:00 P.M.	Oral Presentation Session 2
12:00 - 1:00 P.M.	LUNCH
1:00 - 2:20 P.M.	Oral Presentation Session 3
2:30 - 3:30 P.M.	KEYNOTE Paul J.A. Kenis <i>University of Illinois Urbana-Champaign</i>
3:40 - 4:30 P.M.	Panel Session
4:30 - 6:00 P.M.	Poster Presentations and Reception

KEYNOTE SPEAKER



***“Towards
electrifying
chemical
production”***

with

PAUL J.A. KENIS

Elio E. Tarik Chair of Chemical
Engineering, Director - School
of Chemical Sciences

*University of Illinois
Urbana-Champaign*

September 21, 2023



2:30 p.m. - 3:30 p.m.



NCRC B18 Auditorium



abstract

TOWARDS ELECTRIFYING CHEMICAL PRODUCTION

Since 2010, the electrochemical reduction of CO₂ has evolved from a barely studied topic to one of the most active research areas in the field of electrochemistry. The need to reduce global CO₂ emissions has driven the vigorous exploration of electrocatalysts, electrodes, and electrolyzer configurations that are able to reduce CO₂ (or other renewable feeds) to different value added intermediates or products in ever more selective and energy efficient ways. With many catalysts now available, attention has started to shift to topics such as electrode durability, process intensification, and scaling. One step further, one can use a co-conversion approach where electroreduction of CO₂ on the cathode is performed in parallel with conversion of an industrial waste stream or a renewable feed (e.g., from biomass) into a valued-added chemical on the anode. These efforts increasingly are tied to ever more-detailed techno-economic and life-cycle analyses.

This presentation will provide an overview where some of these 'beyond CO₂RR catalyst discovery' efforts are. What about durability of electrodes in different cell configurations? What should larger electrolyzer stack designs look like, and how should they be operated to maximize performance (rate and/or selectivity)? How should we optimize performance in light of dilute CO₂ feeds from industrial point sources or from direct air capture, with these feeds containing different contaminants and/or oxygen? This presentation will explore some of these aforementioned challenges based on our work on CO₂ valorization, biomass conversion, ammonia oxidation, as well as the production of food from air.

about

PAUL J.A. KENIS

Professor Paul J.A. Kenis holds the Elio E. Tarika Endowed Chair in the department of Chemical and Biomolecular Engineering (ChBE) at the University of Illinois Urbana-Champaign. After serving as the Head of ChBE for 11 years, he now serves as the Director of the School of Chemical Sciences. He received his B.S. in chemistry from Nijmegen Radboud University and his Ph.D. in chemical engineering from the University of Twente, both in the Netherlands. Before starting his independent career at Illinois in 2000, he was a postdoc at Harvard University with George Whitesides.

Kenis is an author of over 220 publications and 14 patents. He has been recognized with a number of awards, including a 3M young faculty award, a CAREER award from the National Science Foundation (NSF), Xerox award, the Energy Technology Division Research Award from the Electrochemical Society (ECS), the Industry Project Award from the Institution of Chemical Engineers (IChemE), and has been elected a Fellow of the ECS. He is a coauthor of reports on the prospects of CO₂ utilization at scale issued by the US National Academies, the Royal Society, and the global Mission Innovation consortium.

TRACK 1: Complex Biological Systems and Targeted Therapeutics

ROOM: NCRC B10 Room 010-G063

9:00 - 9:15 A.M.	YU-JUN HONG ^{13}C metabolic flux analysis identifies unexpected metabolite exchanges in <i>E. coli</i> co-culture
9:15 - 9:30 A.M.	AJAY SHANKARAN Non-small cell lung cancer small extracellular vesicles induce immunosuppressive behavior in neutrophils by leveraging antioxidant mechanism
9:30 - 9:45 P.M.	XIANGCHEN CAI Elucidating dipeptide utilization and metabolism by CHO cells for improved cell culture performance
9:45 - 10:00 A.M.	YU ZHANG A microfluidic platform for developing circular tumor cells (CTCs) organoids for precision medicine in pancreatic cancer
10:00 - 10:15 A.M.	BARON RUBAHAMYA Improving intracellular delivery of an antibody-drug conjugate targeting carcinoembryonic antigen increases efficacy at clinically relevant doses in vivo
10:15 - 10:40 A.M.	BREAK
10:40 - 10:55 A.M.	MELISSA CALOPIZ Computational analysis of coadministration of antibody-drug conjugates to optimize payload delivery for solid tumor treatment
10:55 - 11:10 A.M.	HYEYOUNG KWON Understanding the impact of antibody-drug conjugate therapy on immune response
11:10 - 11:25 A.M.	NNAEMEKA ONUKWUGHA Isolation of EpCAM expressing exosomes using radial flow microfluidic chip with IEDDA chemistry ($^{\text{EpCAM-TCO}}$ OncoBean Chip)
11:25 - 11:40 A.M.	HARRISON BALL Workflow for the isolation and genomic characterization of single circulating tumor cell
11:40 - 11:55 A.M.	RAYMOND ASARE Hierarchical shape complementarity in protein systems

TRACK 2: Materials Modeling and Characterization

ROOM: NCRC B10 Room 010-G064

9:00 - 9:15 A.M.	SHUIAN-BAI ANN Combined first-principles, spectroscopic, and data science studies of selective oxygen species for ethylene epoxidation on Ag/Al ₂ O ₃ catalysts
9:15 - 9:30 A.M.	CHARLOTTE ZHAO Anatomy of a complex crystallization pathway
9:30 - 9:45 P.M.	KODY WHISNANT Self-assembly of semiconductor helices with specific twist counts
9:45 - 10:00 A.M.	GABRIELLE JONES The impact of two-dimensional interfacial curvature and shape anisotropy on particle packing
10:00 - 10:15 A.M.	HSIN-TING CHEN Multi-objective antibody optimization using machine learning
10:15 - 10:40 A.M.	BREAK
10:40 - 10:55 A.M.	TOBIAS DWYER Geometric engineering for self-assembly of host-guest colloidal crystals
10:55 - 11:10 A.M.	KRISTI PEPA A classical density functional theory reformulation of entropic bonding theory
11:10 - 11:25 A.M.	SAMUEL OGUNWALE Flow assurance: modeling multicomponent wax deposition and aging on cold surfaces with application to pipeline fouling
11:25 - 11:40 A.M.	AARTI MATHUR Exploring the performance limits of nanoscale electrocatalysts on planar semiconductor light absorbers for the oxygen evolution reaction
11:40 - 11:55 A.M.	YI DAI Dynamic reconfiguration for modular facilities using machine learning assisted mixed-integer nonlinear model predictive control

TRACK 3: Novel Design and Synthesis Methods

ROOM: NCRC B10 South Atrium

9:00 - 9:15 A.M.	FIKI OWHOSO Effect of covalent modification on proton-coupled electron transfer at quinone-functionalized carbon electrodes
9:15 - 9:30 A.M.	DAVID KITTO Developing ion exchange membranes with ultrahigh charge density
9:30 - 9:45 P.M.	HAN-TING CHEN Formation of mixed bimetallic nanoparticles of immiscible metals through plasma induced reduction of precursors in solutions: a case study of Ag-Pt alloy nanoparticles
9:45 - 10:00 A.M.	CLAIRE YIN Understanding the influence of electrolyte ions in gas-fed flow cells for electrochemical CO ₂ reduction
10:00 - 10:15 A.M.	BINYU WANG High aspect ratio substrate OLEDs for lighting
10:15 - 10:40 A.M.	BREAK
10:40 - 10:55 A.M.	TIEXIN WANG Co-optimizing activity and selectivity of antibody-mediated effector functions using antibody mixtures
10:55 - 11:10 A.M.	BRANDON BUTLER Detecting transition boundaries in molecular simulations
11:10 - 11:25 A.M.	MICHAEL VEKSLER Chiral luminescent nanostructured particles via templated coating
11:25 - 11:40 A.M.	JAMES WORTMAN Enhancing selectivity and stability in LSCF membrane/Na ₂ WO ₄ catalyst microreactors for oxidative coupling of methane: multi-layered hierarchical systems
11:40 - 11:55 A.M.	MOHAMMAD ASADI TOKMEDASH Topography-mediated tissue integration and immune regulation for medial implants

AFTERNOON SESSION

ROOM: NCRC B18 Auditorium (Football Room)

1:00 - 1:20 P.M.

M. VALENTINA GUEVARA

Cargo-free particles effectively divert neutrophil-platelet aggregates to reduce thromboinflammation

1:20 - 1:40 P.M.

SEOKMU KWON

Engineered encapsulins as advanced drug delivery platforms and catalytic nanoreactors

1:40 - 2:00 P.M.

ALAIN KADAR

Graph theoretic modeling of charge transport through films of percolating nanowires

2:00 - 2:20 P.M.

BOSUN ROY-LAYINDE

Alternative approaches to minimizing loss pathways in InGaAs air-bridge cells

POSTER SESSION

ROOM: NCRC B18 Auditorium (Football Room)

4:30 - 6:00 P.M.

AHMET SERT

Modeling charge carrier separation in nanoscale photocatalytic water splitting systems

**ORAL PRESENTATIONS
ABSTRACT BOOK**



NEHA NAGPAL

Isolation and characterization of circulating tumor cells from ductal carcinoma in situ patients using label free technology

SUNGWAN PARK

Exploring programmed dynamic self-assembly in colloidal systems at the air-water interface

**POSTER PRESENTATIONS
ABSTRACT BOOK**



CHIH-MEI YOUNG

Operating conditions and defect effects on the grating diffraction structural color of self-assembled colloidal spheres

POSTER SESSION

ROOM: NCRC B18 Auditorium (Football Room)

4:30 - 6:00 P.M.

FJORELA XHYLIU

Polycation-stabilized synthetic protein nanoparticles for gene delivery

CHENGGONG JIANG

Developing transparent models of hydrogen chemisorption on metal oxides

SYAHIDAH MOHD KHAIRI

Electric field assembly of colloidal discoid crystal for grating diffraction structural color

ANKIT MATHANKER

Impact of electrolytes on phenol solvation and adsorption on a platinum electrode

OLUWATOSIN OHIRO

Kinetics of Generated Species under Low-Temperature Plasma for Ammonia Synthesis

TREVOR TEAGUE

Excluded volume: The geometry of where can't it go?

AREEFA RAHMAN

Development of a calorimetric measurement system for bifacial thermophotovoltaics

SHAWN LU

Understanding structure-selectivity relationships in ethylene epoxidation over industrial-mimic, supported Ag catalysts

EMILY MCCORKLE

Dynamic nanopore microfluidic transfection via electroporation

DURANTE PIOCHE-LEE

Dynamic 3D perfusable cell culture systems for organ-on-chip studies

JEN BRADLEY

Correlating the second virial coefficient with colloidal crystallization

4:30 - 6:00 P.M.

OLUWASEUN AKANBI

Developing particle-based steroid therapeutics with tunable morphologies

SIJUN SEONG

PbS QD – P3HT-COOH composite thin film for stretchable NIR optoelectronics

HARSH PATEL

Understanding the role of water content on counter-ion selectivity in ion exchange membranes contacted by mixed salt systems

CORWIN KERR

Patchy particle potential for molecular dynamics simulation of acoustic bubble rockets

MATTHEW MANION

Characterization of thin film cathodes for microfluidic nanopore electroporation

VICTOR AZUMAH

Effect of Proton Donor on Nitrogen Behavior in Lithium-Mediated Ammonia Synthesis (LiMEAS)

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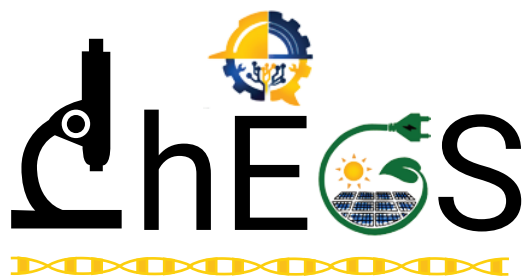
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