

The 4th International Conference on
**New Photocatalytic Materials for
Environment, Energy and Sustainability**
(NPM -4)

The 5th International Conference on
**Photocatalytic and Advanced Oxidation
Technologies for the Treatment of Water,
Air, Soil and Surfaces**
(PAOT-5)

FINAL PROGRAM

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Antwerp University, Antwerp, Belgium
April 23-25, 2019

International Scientific Committee

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IL = Invited Lecture (25 Minutes)

ST= Short Talk (20 Minutes)

TUESDAY, APRIL 23, 2019

8:30 – 10:00 REGISTRATION AND COFFEE

10:00 – 10:10 WELCOMING REMARKS BY THE CONFERENCE CHAIR

SESSION I: CATALYST DEVELOPMENT – I

**10:10 – 10:35 Titanate-Assisted Preparation of Nanostructured
IL Photocatalysts for Pollutant Treatment**
Zhong Chen
School of Materials Science and Engineering, Nanyang Technological
University, Singapore

**10:35 – 11:00 Defining a New Surface Reaction-Rate Constant for C-
IL Based Photocatalysts**
Juan Matos^{1,2,*} and Po S. Poon¹
¹ Hybrid and Carbon Materials Group, Biorefinery Department,
Technological Development Unit (UDT), University of Concepcion,
Chile
² Millennium Nuclei on Catalytic Processes towards Sustainable
Chemistry (CSC), Chile

**11:00 – 11:25 Synthesis and Photocatalytic Performance of K-doped
IL TiO_x Nanostructures**
**Chen Zhou¹, Jie Zhang¹, Lee-Woon Jang¹, So Yoon Lee², Jean-
Pierre Locquet³ and Jin Won Seo¹**
¹ Department of Materials Engineering, KU Leuven, Leuven, Belgium
² Shibaura Institute of Technology, Tokyo, Japan
³ Department of Physics and Astronomy, KU Leuven, Leuven,
Belgium

11:25 -11:50
IL **Hybrid Nanostructures of Metal/2D Materials for Plasmon-enhanced Applications**
Xuanhua Li, Shaohui Guo, and Bingqing Wei
Center for Nano Energy Materials, Northwestern Polytechnical University, Xi'an, China

11:50 – 13:00 **LUNCH BREAK**

SESSION II: SOLAR FUELS

13:00 - 13:25
IL **Titania Single-Crystal Electrode: Energy Conversion and Storage Fundamentals**
Ladislav Kavan
J. Heyrovsky Institute of Physical Chemistry, Prague, Czech Republic

13:25 – 13:50
IL **Water Splitting Activity Enhancement by Protecting Hydrogen Evolution Activity Site from Poisoning of Oxygen Species**
Bin Tian, Wei Gao, Xiaofeng Ning, Yuqi Wu and Gongxuan Lu*
Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou, China

13:50 – 14:15
IL **Electrocatalytic Hydrogen Evolution with Textured Iron Phosphides Thin Films**
Saim Emin
University of Nova Gorica, Ajdovscina, Slovenia

SESSION III: FENTON AND PHOTO-FENTON PROCESSES

14:15 – 14:40
IL **Treatment of Waste Streams by the Fenton's Process in a Bubble Column Reactor**
Vanessa N. Lima, Carmen S.D. Rodrigues and Luis M. Madeira*
LEPABE – Laboratory for Process Engineering, Environment, Biotechnology and Energy, University of Porto, Porto, Portugal

14:40 – 15:00 **COFFEE BREAK**

15:00 – 15:25
IL **Iron(III)-Based Metal Organic Frameworks as Heterogeneous Fenton-Like Catalysts for Organic Pollutants Degradation**
Xie Quan* and Cong Gao
Key Laboratory of Industrial Ecology and Environmental Engineering (Ministry of Education), School of Environmental Science and Technology, Dalian University of Technology, Dalian, China

15:25 – 15:50
IL **Bimetal Cu-Mn Composites as a Photo-Fenton Catalysts for Wastewater Purification at Neutral pH**
Ivalina Trendafilova^{1,2*}, Alenka Ristić¹ and Nataša Novak Tušar^{1,3}
¹National Institute of Chemistry, Ljubljana, Slovenia
²Institute of Organic Chemistry with Center of Phytochemistry, Bulgarian Academy of Sciences, Sofia, Bulgaria
³University of Nova Gorica, Nova Gorica, Slovenia

SESSION IV: REACTOR DESIGN

15:50 – 16:15
IL **Continuous Fixed Bed Photoreactor for Photocatalytic Degradation of Organic Pollutants in Wastewater**
Olga Sacco Vincenzo Vaiano and Diana Sannino
University of Salerno, Department of Industrial Engineering, Fisciano (SA), Italy

16:15 – 16:40
IL **Photocatalytic Reactors: From Design to Proof of Concept**
Siegfried Denys, Jeroen van Walsem and Jelle Roegiers
Sustainable Energy, Air & Water Technology (DuEL), Department of Bioscience Engineering, University of Antwerp, Antwerp, Belgium

16:40 – 17:05
IL **Performance of Flow-Type In-Liquid Plasma System for the Degradation of Ibuprofen in Water**
Chiaki Terashima
Photocatalysis International Research Center, Tokyo University of Science Yamazaki, Noda, Chiba, Japan

17:05 – 18:00 **ANTWERP BEER RECEPTION**

WEDNESDAY, APRIL 24, 2019

SESSION V: VISIBLE LIGHT PHOTOCATALYSTS

8:30 – 8:55

IL

BiOX – The Visible Light Photocatalyst

**Klara Hernadi¹, Enikő Bárdos¹, Nikita Sharma¹, Zsolt Kása¹,
Zsolt Pap^{2,3,4} and Seema Garg⁵**

¹ Department of Applied and Environmental Chemistry, University of Szeged, Szeged, Hungary

² Faculty of Physics, Babeş-Bolyai University, Cluj-Napoca, Romania

³ Institute for Interdisciplinary Research of Bio-Nano-Sciences, Babeş-Bolyai University, Cluj-Napoca, Romania

⁴ Institute of Environmental Science and Technology, University of Szeged, Szeged, Hungary

⁵ Department of Chemistry, Amity University, Noida, Uttar Pradesh, India

8:55 – 9:20

IL

Solar Heterogeneous Photocatalysis for High Added Value Molecules Production

**Marianna Bellardita, Vittorio Loddo, Elisa García López,
Giuseppe Marci and Leonardo Palmisano**

Dipartimento di Energia- Viale delle Scienze Edificio, Palermo, Italy

9:20 – 9:40

ST

Photocatalytic Degradation of Veterinary Drug Compounds via Porous Organic Polymers using Visible Light

**SoEun Kim¹, Christia Jabbour¹, Francis Verpoort^{1,2,3} and
Philippe M. Heynderickx^{1,4*}**

¹ Center for Environmental and Energy Research (CEER) – Engineering of Materials via Catalysis and Characterization, Ghent University Global Campus, Yeonsu-Gu, Incheon, South Korea

² Laboratory of Organometallics, Catalysis and Ordered Materials, State Key Laboratory of Advanced Technology for Materials Synthesis and Processing; Center for Chemical and Material Engineering, Wuhan University of Technology, Wuhan, P.R. China

³ National Research Tomsk Polytechnic University, Tomsk, Russian Federation

⁴ Department of Green Chemistry and Technology, Faculty of Bioscience Engineering, Ghent University, Ghent, Belgium

9:40 – 10:00
ST
Degradation of Acetaminophen under Simulated Sunlight with Activation of Peroxymonosulfate by using Zinc Ferrite from Spent Alkaline Zn-Mn Batteries
Li Ruimeng, Deng Bin, Tan Weihua, Lin Heng and Zhang Hui
Department of Environmental Science and Engineering, Wuhan University, Hubei, China

10:00 – 10:20
COFFEE BREAK

SESSION VI: CATALYST DEVELOPMENT-II

10:20 – 10:45
IL
Plasmonic Core-Shell Nanoparticles for Tuning Near-Field Enhancement in Photocatalytic Applications
Sammy W. Verbruggen
University of Antwerp, Sustainable Energy, Air & Water Technology, Antwerp, Belgium

10:45 – 11:05
ST
A Comparative Study on Mesoporous TiO₂ Film Deposited onto Diverse Glass Substrates for Photooxidation of Acetaldehyde in Gas Phase
Adel. A. Ismail* and L. A. Al-Hajji
Nanotechnology and Advanced Materials Program, Energy & Building Research Center, Kuwait Institute for Scientific Research (KISR), Safat, Kuwait

11:05 – 11:25
ST
On the Photocatalytic Properties of h-MoO₃ Microrods under Visible Light
P. Almodóvar¹, S. Suárez², C. Álvarez², C. Díaz – Guerra¹ and B. Sánchez²
¹ Departamento de Física de Materiales, Facultad de Ciencias Físicas, UCM, Ciudad Universitaria, Madrid, Spain
²FOTOAIR-Ciemat, Unit of Analysis and Photocatalytic Treatment of Pollutants in Air, Madrid, Spain

11:25 – 11:45
ST
Highly Enhanced Visible Light Photocatalytic Activity of N, Transition Metal Co-doped TiO₂ Nanocrystal by Hydrothermal and Chemical Reduction Method with Transition Metal Ion
Dayeon Wi and Kwang-Cheol Lee
Photonic Energy Research Center, Korea Photonics Technology Institute (KOPTI), Rep. of Korea

- 11:45 – 12:05
ST **The Reactive Sputter Deposition of Photocatalytic Films on Fly Ash Particles**
A. H. Gaddah, M. Ratova, H. Potgieter and P. Kelly
Manchester Metropolitan University, Surface engineering group, Manchester, United Kingdom
- 12:05- 12:25
ST **Pt/TiO₂ Photocatalysts Deposited on Commercial Support for Photocatalytic Reduction of CO₂**
Minoo Tasbihi¹, Kamila Kocí², Miroslava Edelmannová², Ivana Troppová², Martin Reli² and Reinhard Schomäcker¹
¹Department of Chemistry, Technical University of Berlin, Berlin, Germany
²Institute of Environmental Technology, VŠB-Technical University of Ostrava, Ostrava, Poruba, Czech Republic
- 12:25 – 13:30 **LUNCH BREAK**

SESSION VII: CATALYST DEVELOPMENT – III

- 13:30 -13:55
IL **Nanoporous Photocatalysts with Varying Metal Compositions for the Environmental Remediation of Aqueous Pollutants**
R.G. Ciocarlan¹, E.M. Seftel^{1,2}, G. Carja³ and P. Cool¹
¹Laboratory of Adsorption and Catalysis, Department of Chemistry, University of Antwerp, Belgium
²VITO, Flemish Institute for Technological Research, Mol, Belgium
³Department of Chemical Engineering, Technical University “Gh. Asachi” of Iasi, Iasi, Romania
- 13:55 -14:15
ST **A Composite of Platelet-Like Orientated BiVO₄ Fused with MIL-125(Ti): Synthesis and Characterization**
Philani Vusumuzi Hlophe, Lwazi Charles Mahlalela and Langelihle Nsikayezwe Dlamini*
Department of Chemical Sciences, University of Johannesburg, Doornfontein Campus, Johannesburg, South Africa
- 14:15 – 14:35
ST **Photocatalytic Degradation of Atrazine using BiVO₄ with Different Morphologies Fused with Bi₂O₃**
Lwazi Charles Mahlalela¹, Cintia Casado², Javier Marugán², Santiago Septien³, Thabile Ndlovu⁴ and Langelihle Nsikayezwe Dlamini^{1*}

¹Department of Applied Chemistry, University of Johannesburg, Johannesburg, South Africa

²Department of Chemical and Environmental Technology, ESCET, Universidad Rey Juan Carlos, Madrid, Spain

³Pollution Research Group, University of KwaZulu Natal, Howard College, Durban, South Africa

⁴Department of Chemistry, University of Swaziland, Kwaluseni Campus, Kwaluseni, Swaziland

- 14:35 – 14:55
ST **Bi₂O₃/TiO₂ Hetero-Junction Photocatalytic Coatings Prepared by Reactive Magnetron Sputtering for Water Treatment Application**
Matthieu Grao*, Marina Ratova and Peter Kelly
Surface engineering group, Manchester Metropolitan University, Manchester, United Kingdom
- 14:55 – 15:15
ST **Deposition of Pt onto P25 via Atomic Layer Deposition and its Role on the Photocatalytic Activity**
Dominik Benz, Kevin Felter, Tom Savenije, Henk Nugteren, Michiel T. Kreutzer, J. Ruud van Ommen
Delft University of Technology, Delft, The Netherlands
- 15:15 – 15:35 **COFFEE BREAK**
- 16:00 – 17:30 **SOCIAL PROGRAM: “TASTING WALK OF ANTWERP”**
- 19:30 – 21:30 **BANQUET DINNER**

THURSDAY, APRIL 25, 2019

SESSION VIII: ADVANCED OXIDATION PROCESSES

- 9:00 – 9:25
IL **The Roles of HCO₃⁻/CO₃²⁻ in Catalytic Oxidation Processes**
Erzsébet Illés^{1,2}, Amir Mizrahi³, Vered Marks¹, Haya Kornweitz¹, Ariela Burg⁴ and **Dan Meyerstein**^{1,5}
¹Chemical Sciences Dept., and the Schlesinger Family Center for Compact Accelerators, Radiation Sources and Applications, Ariel University, Ariel, Israel

² Radiation Chemistry Dept., Institute for Energy Security and Environmental Safety, Centre for Energy Research, Hungarian Academy of Sciences, Budapest, Hungary

³ Chemistry Dept., Nuclear Research Centre Negev, Beer-Sheva, Israel

⁴ Chemical Eng. Dept., Sami Shamoon College of Engineering, Beer-Sheva, Israel

⁵ Chemistry Dept., Ben-Gurion University, Beer-Sheva, Israel

9:25 – 9:50
IL

Photocatalytic Oxidation using Wireless Powered UV-A LEDs

Marco S. Lucas

Centro de Química de Vila Real, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal

9:50 – 10:15
IL

Photocatalytic, Photolytic and Radiolytic Elimination of Pesticides from Aqueous Solution: Reaction Mechanism, Efficiency, Matrix Effect and Economic Considerations

Tünde Alapi¹, Máté Náfrádi¹, Georgina Rózsa¹, Krisztina Schrantz¹, Tamás Hlogyik¹, Luca Farkas¹, László Wojnárovits², Erzsébet Takács², Klára Hernádi³ and Andreas Fath⁴

¹Department of Inorganic and Analytical Chemistry, University of Szeged, Szeged, Hungary

²Institute for Energy Security and Environmental Safety, Centre for Energy Research, Hungarian Academy of Sciences, Budapest, Hungary

³Department of Applied and Environmental Chemistry, University of Szeged, Szeged, Hungary

⁴Faculty of Medical and Life Sciences, Hochschule Furtwangen University, Campus Villingen-Schwenningen, Germany

10:15 – 10:35
ST

Improving the Detection Methodology for Photocatalytic Soot Degradation

Myrthe Van Hal and Sammy Verbruggen

University of Antwerp, Sustainable Energy, Air & Water Technology, Antwerp, Belgium

10:35 – 10:55

COFFEE BREAK

10:55 – 11:20
IL

Advanced Oxidation Technologies as Alternative for UV-Filters Removal

Henry Zúñiga-Benítez^{1,2} and Gustavo A. Peñuela²

¹ Departamento de Ingeniería Química, Facultad de Ingeniería, Universidad de Antioquia UdeA, Medellín, Colombia

² Grupo GDCON, Facultad de Ingeniería, Sede de Investigación Universitaria (SIU), Universidad de Antioquia, Medellín, Colombia

11:20 – 11:45
IL

The Change of 3D Structure and Biophysical Properties of Various Microbial Cells during the Photo-Disinfection Process

Jing-Hua Tzeng¹, Che-Jui Chang¹, Chih-Huang Weng², Li-Ting Yen¹ and Yao-Tung Lin^{1*}

¹Department of Soil and Environmental Sciences, National Chung Hsing University, Taichung, Taiwan

²Department of Civil and Ecological Engineering, I-Shou University, Kaohsiung City, Taiwan

11:45 – 12:10
IL

The Wide Spectrum Ecotoxicology of Titania Photocatalysts: Nanoecotoxicological Study on Different Ant Species Including Food Foraging, Mortality and Behavioral Interactions

Zsolt Czekes^{1,2}, Eszter Mátyás^{1,2}, Kata Saszet^{1,3}, Lucian Baia^{1,3}, Emese Gál⁴, Klára Hernádi⁵ and Zsolt Pap^{1,6}

¹Faculty of Biology and Geology, Babeş–Bolyai University, Cluj-Napoca, Romania

²Nanostructured Materials and Bio-Nano-Interfaces Center, Institute for Interdisciplinary Research on Bio-Nano-Sciences, Babeş – Bolyai University, Cluj-Napoca, Romania

³Faculty of Physics, Babeş–Bolyai University, Cluj–Napoca, Romania

⁴Faculty of Chemistry and Chemical Engineering, Babeş–Bolyai University, Cluj-Napoca, Romania

⁵Department of Applied and Environmental Chemistry, University of Szeged, Szeged, Hungary

⁶Institute of Environmental Science and Technology, University of Szeged, Szeged, Hungary

12:10 – 12:30
ST

Selective Oxidation of Environmental Endocrine Disrupting Chemicals by Photoelectrocatalytic Method

Hongying Zhao, Junzhuo Cai, Chenyan Guo, Bo Tang and Guohua Zhao*
School of Chemical Science and Engineering, and Shanghai Key lab of Chemical Assessment and Sustainability, Tongji University, Shanghai, China

12:30 – 12:50 **Degradation of Pharmaceutical Residues in Water by
ST the Ozone-Activated Peroxymonosulfate Process**
**Emma Deniere¹, Stijn Van Hulle², Herman Van Langenhove¹
and Kristof Demeestere¹**
¹Research group EnVOC, Ghent University, Ghent, Belgium
²Research group LIWET, Ghent University, Kortrijk, Belgium

12:50 – 14:00 **LUNCH BREAK**

**SESSION IX: CHALLENGES IN OXIDATION OF PFAS AND PFOA AND
NEXTGEN PHOTOCATALYTIC DESIGN AND OPPORTUNITIES PFAS**

14:00 – 14:25 **Treatability of PFAS by Advanced Oxidation/ Reduction
IL Technologies Using ZVI Combined with Oxidants**
**Naomi Gevaerd de Souza¹, Akshay Parenky¹, Hiep Nguyen²,
Junha Jeon² and Hyeok Choi^{1,*}**
¹Department of Civil Engineering, The University of Texas at
Arlington, Arlington, TX, USA
²Department of Chemistry and Biochemistry, The University of
Texas at Arlington, Arlington, TX, USA

14:25 – 14:45 **Efficient Degradation of PFOA via Adsorption on Fe-
ST Zeolites and 366 nm UV Photo-Oxidation**
**Lin Qian, Anett Georgi, Mireia Arqué Hernández and Frank-
Dieter Kopinke**
Centre for Environmental Research - UFZ, Leipzig, Germany

14:45 – 15:05 **NextGen Photocatalytic Opportunities in the Proposed
ST Energyshed Model: A New American Perspective on
Climate Change with the Competitive CHO-Cycle of the
ECHO Principle**
R. C. Dalton
ESTEC Technology Works, LLC, Columbia, South Carolina, U.S.A.

15:05 – 15:25 **NextGen Photocatalytic Technology Design for Modern
ST Energy Economics in the Energyshed Model**
R. C. Dalton
ESTEC Technology Works, LLC, Columbia, South Carolina, U.S.A.

15:25 – 15:30 **CLOSING REMARKS AND DEPARTURE**