

The 3rd International Conference on
**New Photocatalytic Materials for
Environment, Energy and Sustainability**
(NPM -3)

The 4th International Conference on
**Photocatalytic and Advanced Oxidation
Technologies for the Treatment of Water,
Air, Soil and Surfaces**
(PAOT-4)

Final Program

**Almeida Garret Municipal Library, Porto, Portugal
July 10-13, 2018**

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Invited Lecture (IL): 25 min

Short Talk (ST): 15min

Tuesday, July 10, 2018

12:00 – 13:45 **Registration**

13:45 – 14:00 **Introductory Remarks**

Session 1: Fundamentals and Advances in Photocatalysis

14:00 – 14:25 **Charge Carriers in Commercial Photocatalysts: Fractal Kinetics and Effect of “Inert” Additives**

Detlef Bahnemann^{1,2}, **Fabian Sieland**¹, and **Jenny Schneider**¹

¹Leibniz Universität Hannover, Hannover, Germany

²Saint-Petersburg State University, Saint-Petersburg, Russia

14:25 – 14:50 **Transient Phenomena in Photocatalysis, as Studied by Ultrafast FTIR Measurements**

Y. Paz, **I. Benisti**, and **A. Ben Refael**

Department of Chemical Engineering, Technion, Haifa, Israel

14:50 – 15:15 **TiO₂ Functionalized-Polyurethane Microcapsules for Mosquito Repellency**

Juliana Marques, **Tiago D. Gomes**, and **Carlos J. Tavares**

University of Minho, Guimarães, Portugal

15:15 – 15:40 **Solar Photocatalytic Water Purification at Rural Areas, State of Art**

Juan Rodríguez

Universidad Nacional de Ingeniería, Lima, Perú

15:40 – 16:05 **Photodegradation of the Radionuclide Complexants**

C. Guillard¹, **E. Drinks**^{1,2}, **K. Rekab**^{1,2}, **M. Dunand**², **F. Dappozze**¹, and **C. Lepeyre**²

¹Université Lyon, Villeurbanne, France

²Laboratoire des Procédés Supercritiques et de Décontamination, Bagnols-sur-Cèze, France

16:05 – 16:30 **Posters & Coffee Break**

Session 2: Photocatalytic Materials

- 16:30 – 16:45 **Deposition of Carbon Dots and Some Semiconductors on Nanosheets of Graphitic Carbon Nitride to Fabricate Highly Efficient Visible-Light-Driven Photocatalysts**
Aziz Habibi-Yangjeh and Soheila Asadzadeh-Khaneghah
University of Mohaghegh Ardabili, Ardabil, Iran
- 16:45 – 17:00 **Evaluation of Coating Parameters and Photocatalytic Performance of Immobilized TiO₂ Using Thermokinetic, Wet Chemical and Vacuum Deposition Processes**
Nikolai Otto¹, Phuong Vu², Ramona Hojenski¹, Josefine Els¹, Andreas Vogel², and Uwe Menzel¹
¹ Institute for Sanitary Engineering, Water Quality and Solid Waste Management; University of Stuttgart, Stuttgart, Germany
² Institute for Manufacturing Technologies of Ceramic Components and Composites; University of Stuttgart, Stuttgart, Germany
- 17:00 – 17:15 **PPCPs Photocatalytic Degradation Using Novel Modified Fe-Co Titanate Nanowires**
B. Barrocas and O.C. Monteiro
Universidade de Lisboa, Lisboa, Portugal
- 17:15 – 17:30 **Investigation of Photoprocesses in Au/TiO₂ Heterostructures**
A. Murashkina, T. Bakiev, V. Ryabchuk, and A. Emeline
Saint Petersburg State University, Saint Petersburg, Russia
- 17:30 – 18:00 **Porto d' Honra & Posters**

Wednesday, July 11, 2018

Session 3: Photocatalytic Water Treatment – I

- 9:00 – 9:25 **Studies on the Adsorption and Photocatalytic Decomposition of Dyes on the TiO₂ Oxidised by H₂O₂**
Antoni W. Morawski, Ewelina Kusiak-Nejman, Aleksandra Babyszko, and Agnieszka Wanag
West Pomeranian University of Technology, Szczecin, Poland
- 9:25 – 9:50 **Effects of Cu and Zr Loadings on TiO₂ Photocatalysis in Water**
Urska Lavrencic Stangar^{1,2}, Olena Pliekhova², Tihana Cizmar², and Iztok Arcon^{2,3}
¹University of Ljubljana, Ljubljana, Slovenia

²University of Nova Gorica, Nova Gorica, Slovenia; Jozef Stefan Institute, Ljubljana, Slovenia

9:50 – 10:15 **Application of Quantum Dots in Heterogeneous Photocatalysis**
B. Bajorowicz¹, A. Malankowska¹, J. Sowik¹, A. Mikołajczyk¹, M. Miodyńska¹, T. Klimczuk², G. Trykowski³, W. Lisowski⁴, and A. Zaleska-Medynska¹

¹University of Gdansk, Gdansk, Poland

²Gdansk University of Technology, Gdansk, Poland

³Nicolaus Copernicus University, Torun, Poland

⁴Polish Academy of Sciences, Warsaw, Poland

10:15 – 10:40 **A General Model of Adsorption and Kinetics to Interpret the Performance of Hybrid Photocatalysts: Application to TiO₂-Graphene**
C. Minero, M. Minella, and P. Calza
University of Torino, Torino, Italy

10:40 – 11:05 **Coffee Break**

Session 4: Photocatalytic Hydrogen Generation

11:05 – 11:30 **The Influence of the Type and Intensity of Light in the Process of Photocatalytic Hydrogen Production and Photocatalytic Degradation of Sulfamethoxazole**
Katarzyna Bednarczyk¹, Marta Gmurek², Artur Lewandowski¹, and Marek Stelmachowski¹
Lodz University of Technology, Lodz, Poland

11:30 – 11:55 **Visible Light Driven Overall Water Splitting for Hydrogen Production over CdS/NaYF₄:Yb³⁺-Er³⁺ Photocatalysts**
Gongxuan Lu and Wei Gao
Chinese Academy of Science, Lanzhou, China

11:55 – 12:20 **Interface Engineering for Achieving High Visible-Light Photoactivity: Multi-Layered ZnS-GaP Thin Films**
Judy N. Hart¹, Collin K. Y. Park¹, Fran Kurnia¹, Mohammed Al-Farsi¹, Yun Hau Ng², Nagarajan Valanoor¹, and Neil L. Allan³
¹School of Materials Science and Engineering, UNSW Sydney, Australia
²School of Chemical Engineering, UNSW Sydney, Australia
³University of Bristol, Bristol, United Kingdom

Session 5: Fenton Based Reactions

12:20 – 12:45 **Trends in Fenton-Based Processes for Wastewater and Soil Remediation: Cases of Study**

Marta Pazos, Emilio Rosales, Aida Díez, and M Angeles Sanromán
University of Vigo, Vigo, Spain

12:45 – 14:00 **Lunch Break**

14:00 – 14:25 **Use of Fenton-like Processes for Wastewater Treatment: Technological Perspectives and Integration with other Technologies**

Luis M. Madeira, Carmen S.D. Rodrigues, and Bruno M. Esteves
University of Porto, Porto, Portugal

14:25 – 14:50 **Design of Bimetal Photo-Fenton-Type Catalyst for Wastewater Treatment at Neutral pH**

Nataša Novak Tušar^{1,2} Andraž Šuligoj^{1,2}, and Albin Pintar¹

¹National Institute of Chemistry, Ljubljana, Slovenia

²University of Nova Gorica, Nova Gorica, Slovenia

³University of Ljubljana, Ljubljana, Slovenia

14:50 – 15:15 **Metal-free Carbonaceous Materials In-Situ Generation of H₂O₂ for Efficient Electro-Fenton Degradation of Organic Pollutants**

Xie Quan and Kun Zhao

Dalian University of Technology, Dalian, China

15:15 – 15:40 **Photo-Electrochemical/Electro-Fenton Coupling Oxidation System with Fe/Co-Based Anode and Cathode Metal-Organic Frameworks Derivative Materials for Sulfamethoxazole Treatment**

Xinyong Li^{1,2}, Xin Chen, Shiyong Fan¹, Mingmei Zhang¹, Zhifan Yin¹, Moses O. Tadé², and Shaomin Liu²

¹Dalian University of Technology, Dalian, China

²Curtin University, Perth, Australia

15:40 – 16:05 **Poster & Coffee Break**

Session 6: Advanced Oxidation Processes – I

16:05 – 16:20 **Degradation of Pesticides from Waste Water with Advanced Oxidation Processes (AOP)**

Agnieszka Mos-Hummel and Klaus Nonnenmacher

ANSEROS Klaus Nonnenmacher GmbH, Tübingen, Germany

- 16:20 - 16:35 **Photoactive MIL-100 (Fe) for Water Contaminants Removal by Photocatalytic Ozonation and Photo-Fenton Processes**
A. M. Chávez, A. Rey, F. J. Beltrán, and P. M. Álvarez
Universidad de Extremadura, Badajoz, Spain
- 16:35 - 16:50 **Mineralization of Reactive Black 5 by Heterogeneous Photo-Fenton Process**
Tan Weihua¹, Ai Jia^{1,2}, Huang Yaohui², and Zhang Hui¹
¹ Wuhan University, Hubei, China
² National Cheng Kung University, Taiwan
- 16:50 - 17:05 **BiOCl and TiO₂ Nanoparticles Modified Cotton Fibers by *In Situ* Straightforward Approach for Wastewater Treatment by Photocatalysis**
Virginia C. Ferreira¹, A. J. Goddard², and O.C. Monteiro¹
¹Universidade de Lisboa, Lisboa, Portugal
²University of Leicester, Leicester, UK
- 17:05 - 17:20 **Gold Nanoparticles Decorated ZnO Nanorods for Efficient Photocatalytic Oxidation of Wastewater Pollutants**
T. Dedova, K. Balmassov, A. Katerski, I. Gromyko, M. Krunks, and I. Oja Acik
Tallinn University of Technologies, Tallinn, Estonia
- 17:20 - 17:35 **Using Titanate Elongated Nanostructures as a New Tool to Remove Emergent Pollutants for Wastewaters**
Sara C. A. Sousa and O.C. Monteiro
Universidade de Lisboa, Lisboa, Portugal
- 17:35 - 17:50 **RONs Generation and Conditioning of Selected Liquids in Mini-Gad Reactor**
Joanna Pawlat¹, Michał Kwiatkowski¹, Piotr Terebun¹, Barboratarabová², Zuzanna Kovalová², Katarina Kučerová², Zdenko Machala², Mario Janda², and Karol Hensel²
¹Lublin University of Technology, Lublin, Poland
²Comenius University, Bratislava, Slovakia

Thursday, July 12, 2018

Session 7: Photocatalytic & Electrocatalytic Hydrogen, Oxygen and Chlorine Generation

9:00 – 9:25 **Rational Insight into the Impact of Native Defects on the Photocatalytic Features of Monoclinic BiVO₄: A First-Principles Computational Study**

Moussab Harb, Sheikha Lardhi, and Luigi Cavallo

King Abdullah University of Science and Technology, Thuwal, Saudi Arabia (KSA)

9:25 – 9:50 **Challenges and Opportunities in Scaling up BiVO₄ Photoanode toward PEC Water Splitting**

Xin Yao, D. P. Wang, T. Sritharan, and Zhong Chen

Nanyang Technological University, Singapore

9:50 – 10:15 **Electrocatalytic Hydrogen Evolution with Textured Tungsten Carbide and Tungsten Diselenide**

Saim Emin

University of Nova Gorica, Slovenia

10:15 – 10:40 **Electrochemical Oxygen & Chlorine Production: Enhancing Electrocatalytic Activity Using Atomic Layer Deposition**

Michael R. Hoffmann

California Institute of Technology, Pasadena, California

10:40 – 11:05 **Coffee Break**

Session 8: Solar Cell & Photo-electrochemical Cell

11:05 – 11:30 **Perspective of Photo-Energy Conversion Using Nano-Structured Molecular Systems: Water Photo- Splitting to HOOH and H₂, and Quantum-Wire PbI₆⁴⁻-Based Solar Cells**

Shozo Yanagida

Osaka University, Osaka, Japan

11:30 – 11:55 **Carbon-based Nanomaterials as Superior Metal-Free Counter Electrodes for Dye-Sensitized Solar Cells**

Chang Ki Kim, M. Aftabuzzaman, and Hwan Kyu Kim*

Korea University, Sejong, Korea

11:55 – 12:20 **Inorganic Photoabsorbers for Use as Top Cell in a Tandem Device with a Silicon Bottom Cell**
Dowon Bae¹, Korina Kuhar¹, Andrea Crovetto¹, Mohnish Pandey¹, Kristian S. Thygesen¹, Brian Seger¹, Peter C. K. Vesborg¹, Ole Hansen², Ib Chorkendorff¹ and Karsten W. Jacobsen¹, and Peter C. K. Vesborg¹
¹DTU- Physics, Technical University of Denmark, Kgs. Lyngby, Denmark
²DTU-Nanotech, Technical University of Denmark, Kgs. Lyngby, Denmark

12:20 – 12:45 **Photo-Electrochemical Air Treatment with Simultaneous Energy Recovery**
Sammy W. Verbruggen
University of Antwerp, Antwerp, Belgium

12:45 – 14:00 **Lunch Break**

Session 9: Advanced Oxidation Processes – II

14:00 – 14:25 **Modelling Photocatalytic Reactors for Design and Optimization**
Siegfried Denys
University of Antwerp, Antwerp, Belgium

14:25 – 14:50 **Efficient Degradation of Water Pollutants and Air Disinfection by VUV Assisted Photocatalysis**
Dennis Y. C. Leung¹ and Haibao Huang²
¹University of Hong Kong, Hong Kong, China
²Sun Yat Sen University, Guangzhou, China

14:50 – 15:15 **Ozonation in a Multi-Orifice Oscillatory Baffled Column**
Marco S. Lucas^{1,2}, Nuno M. Reis³, and Gianluca Li Puma¹
¹Loughborough University, Loughborough, UK
²Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Portugal

15:15 – 15:40 **Scavenging Effect of Halides on Self-Enhanced Ozonation and Recovery with Phosphate and Sulfate**
Jacek Nawrocki and Lilla Fijolek
A. Mickiewicz University, Poznań, Poland

15:40 – 16:05 **Metal-free Catalysts for Activation of Persulfates in Water Decontamination: Challenges and Prospects**
Teik-Thye Lim, Xiao Chen, and Wen-Da Oh
Nanyang Technological University, Singapore

16:05 – 16:30 **An Effective way for Complete Oxidation of Hydrogen Sulfide Found in Well Water**

Y. Paz and Y. Tzvi

Department of Chemical Engineering, Technion, Haifa, Israel

16:30 – 20:30 **Social Event/Free Time**

20:30 **Banquet Dinner**

Friday, July 13, 2018

Session 10: Photocatalytic Water Treatment –II

9:00 – 9:25 **Titanate Nanotubes: A Versatile Building-Block to Design New Photocatalysts**

O. C. Monteiro

Universidade de Lisboa, Lisboa, Portugal

9:25 – 9:50 **Advanced Photocatalytic Nanomaterials and Immobilization Strategies for Efficient Water Remediation**

P. M. Martins^{1,2} and S. Lanceros-Mendez^{3,4}

¹Centre/Department of Physics, University of Minho, Braga, Portugal

²Center of Biological Engineering, University of Minho, Braga, Portugal

³Basque Centre for Materials, Applications and Nanostructures, UPV/EHU Science Park, Leioa, Spain

⁴Basque Foundation for Science, Bilbao, Spain

9:50 – 10:15 **Development of Photocatalytic Membranes for Water Treatment**

Sergio Morales -Torres

University of Granada, Granada, Spain

10:15 – 10:40 **In-situ Images and Biophysical Properties of Inactivated Bacterial Membrane using Visible-light Responsive Photocatalyst**

Jing-Hua Tzeng¹, Chih-Huang Weng², and Yao-Tung Lin¹

¹National Chung Hsing University, Taichung, Taiwan

²I-Shou University, Kaohsiung City, Taiwan

10:40 – 11:05 **Coffee Break**

Session 11: Photocatalytic Materials & Synthesis

- 11:05 – 11:30 **Chemoinformatic Methods in Designing Photocatalytic Materials**
Alicja Mikołajczyk and **Tomasz Puzyn**
University of Gdańsk, Gdańsk, Poland
- 11:30 – 11:55 **Nanostructured Carbon-Based Materials for Environmental Applications and Energy Conversion**
Luisa M. Pastrana-Martínez
University of Granada, Granada, Spain
- 11:55 – 12:20 **Reduction of Nitro Group by Photoexcited TiO₂: the Case of 5-Nitrosalicylic Acid**
Alessandra Molinari, Marco Fogagnolo, and Rossano Amadelli
University of Ferrara, Ferrara, Italy
- 12:20 – 12:45 **Photocatalytic oxidation of aniline to nitrosobenzene over MO/TiO₂ (M = Mg, Ca, Sr, Ba)**
Jinsong Chen, Yujie Song, Binbin Guo, and **Ling Wu**
Fuzhou University, Fuzhou, China
- 12:45-13:10 **Toward Sustainable Chemical Synthesis: Combining Metal-Free Photocatalysts with Energy-Efficient Light Sources**
Cláudia G. Silva, Maria J. Lima, Maria J. Sampaio, Raquel A. Fernandes, Joana C. Lopes, Adrián M.T. Silva, and Joaquim L. Faria
Universidade do Porto, Porto, Portugal

Posters

DFT Study of Methanol Adsorption on CeO₂ Low-Index Surfaces

Zhao Liu, Pramod Koshy, Charles C. Sorrell, and **Judy N. Hart**

University of South Wales, Sydney, Australia

Advanced Diffuse Reflectance Spectroscopy for the Study of Charge Separation in Al-Doped Titania

Nadezhda Glazkova, Vyacheslav Kuznetsov, and Ruslan Mikhaylov

St. Petersburg State University, St. Petersburg, Russia

Nick Serpone

Università di Pavia, Pavia, Italy

Heterogeneous Fenton Process: New Types of Iron-Based Catalysts

T. D. Ferreira, A. Romeiro, A. C. Serra, and P. N. Simões,

University of Coimbra, Coimbra, Portugal

Aplicación of Ag-NP-TiO₂ P-25 Hybrid Materials As Efficient Photocatalysts for Visible Light Photodegradation of 2-4 Dichlorophenoxyacetic Acid in Aqueous Medium

M. Suárez-Quezada¹, L. Lartundo-Rojas², B. Rojas-Trigos¹, V. Suárez³, and A. Mantilla¹

¹Instituto Politécnico Nacional, CICATA-Legaria, México.

²CONACyT Research Fellow Universidad Autónoma Metropolitana Iztapalapa, México

³Instituto Politécnico Nacional, CNMN, Luis Enrique Erro s/n, México

Enhanced Adsorption of Radioactive ¹³⁷Cs on Prussian Blue/TiO₂ Composites by UV Light Irradiation

Soonhyun Kim, Minsun Kim¹, Hyuncheol Kim² and Wannoo Lee²

¹Smart Textile Convergence Research Group, Daegu Gyeongbuk Institute of Science and Technology (DGIST), Daegu, Republic of Korea

²Nuclear Emergency and Environmental Protection Division, Korea Atomic Energy Research Institute (KAERI), Daejeon, Republic of Korea

Microalgae/UV-LEDs Winery Wastewater Treatment

Leonilde Marchão, Pedro B. Tavares, José R. Fernandes, and José A. Peres, Marco S. Lucas

Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal

Photoactivity of Fluorine Doped TiO₂

K. V. Nikitin, D. A. Zharovov, L. L. Shaytanov, V. K. Ryabchuk, and A. V. Emeline
Saint Petersburg State University, Russia

Temperature-Programmed Desorption of CO₂, Formed by Photooxidation of CO on TiO₂ Surface

Ruslan V. Mikhaylov, K.V. Nikitin, N.I. Glazkova, V.N. Kuznetsov, and P.E. Lavrik
St. Petersburg State University, St. Petersburg, Russia

A Combined Process for Global Remediation of Textile Effluents

M. Angeles Sanromán, Emilio Rosales, and Marta Pazos

Department of Chemical Engineering, University of Vigo, Isaac Newton Building, Campus As Lagoas, Marcosende 36310, Vigo, Spain

Oxone® Activation for Ionic liquid degradation

María Arellano, M Angeles Sanromán, and Marta Pazos

Department of Chemical Engineering, University of Vigo, Isaac Newton Building, Campus As Lagoas, Marcosende 36310, Vigo, Spain

QAICar Project: Indoor Air Quality in Vehicle Cabin- Odor and Microorganism Treatment

C. Guillard¹, M. Hamandi,¹ P. Vernoux¹, K. Woehrle^{1,2}, C. Gilbert², H. Kaper³, M. El Hajem⁴, T-D. Nguyen⁴, K. Pajot⁵, B. Pintat⁵, L. Lamaa⁶, L. Peruchon⁶, D. Lorito⁶, C. Brochier⁶, and J-B. Yvon⁷

¹ IRCELYON, CNRS, UCBL (UMR 5256), Villeurbanne (69), France

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⁵ PSA Group, Velizy-Villacoublay (78), France,

⁶ Brochier Technologies, Villeurbanne (69), France

⁷ EFI Lighting, Beynost (01), France

Villeurbanne,(69) France

Insights into Nonylphenol Degradation by Activated Persulfate in Aqueous Matrices: A Comparative Study

Balpreet Kaur, Eneliis Kattel, Marina Trapido, and Niina Dulova

Tallinn University of Technology, Tallinn, Estonia

***p*-Nitrophenol Oxidation by Fenton's Oxidation Using Modified Iron-Activated Carbons as Catalysts**

C. S. D. Rodrigues¹, O. S. G. P. Soares², M. F. R. Pereira², and L. M. Madeira¹

¹ LEPABE, DEQ, FEUP, Porto, Portugal

² LCM, Laboratório Associado LSRE-LCM, DEQ, FEUP, Porto, Portugal

Synthesis and Characterization of ZnO Nanorods /Graphene Oxide Composites Films with Enhanced Photocatalytic Activity

Bryan Yauri, Brian Huayta, Luis Sanchez, Clemente Luyo, and Juan Rodriguez

Universidad Nacional de Ingeniería, Lima, Perú

A Promising Technological Approach to Improve Indoor Air Quality

Th. Maggos¹, V. Binas², V. Siaperas³, A. Terzopoulos³, P. Panagopoulos¹, and G. Kiriakidis²

¹ NCSR "Demokritos", Athens, Greece

² Institute of Electronic Structure and Laser, Foundation for Research and Technology, Greece

³ 691 Military Research Centre, Aulonias, Greece