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EDUCATION

2001-2006:	Ph.D. in Chemical Engineering, University of Patras, Greece, degree: excellent.
	Subject: "Development and characterization of novel catalytic materials for the
	Low temperature Water-Gas Shift reaction and kinetic study". Supervisor: D.I.
	Kondarides.

2001-2006: MSc. in Chemical Engineering, University of Patras, Greece, degree: excellent. Subject: "Energy and Environment". Supervisor: D.I. Kondarides.

1996-2001: Diploma of Chemical Engineer, University of Patras, Greece, degree: 7.39 (advance).

PROFESSIONAL EXPERIENCE

- 2021-today: Associate Professor, School of Chemical and Environmental Engineering, Technical University of Crete.
- 2014-2020: Assistant Professor, School of Chemical and Environmental Engineering, Technical University of Crete.
- 2012-2014: Senior Postdoctoral Researcher, Catalysis Center for Energy Innovation (CCEI), Department of Chemical and Biomolecular Engineering, University of Delaware, USA.
- 2006-2012: Post-doctoral Fellow Researcher, Department of Chemical Engineering, University of Patras, Greece
- 2007-2009: Employee-Researcher at the HELBIO S.A. Hydrogen and Energy Production Systems (HELBIO is a Greek company, with expertise in the development, design and commercialisation of hydrogen, electricity and heat production systems using fuel cells).

EDUCATIONAL EXPERIENCE

2014-2021: Assistant and Associate Professor, School of Chemical and Environmental Engineering, Technical University of Crete (Teaching of the courses: "Environmental Thermodynamics", "Reaction Engineering (Chemical and Biochemical Processes)", "Field Studies I", "Special Topics of Catalytic surfaces and Catalytic Processes for Environmental Applications", "Advanced air pollutant treatment technologies").

- 2017-2021 : Collaborating Educational Staff at the School of Science and Technology of the & 2011-2013 Open Hellenic University. (Supervisor of one diploma thesis as a part of the Postgraduate Program "Catalysis and Environmental Protection").
- 2011-2012: Adjunct Lecturer, Department of Chemistry, University of Patras (Teaching of two courses: (a) Physical Processes of Chemical Technology and (b) Chemical Processes).
- 2010-2011: Adjunct Lecturer, Department of Business Administration of Food and Agricultural Enterprises, University of Western Greece (Teaching of the course: General and Inorganic Chemistry).
- 2009-2012: Supervisor in collaboration with the professors X.E. Verykios and D.I. Kondarides of five Ph.D. theses at the Department of Chemical Engineering of University of Patras.
- 2002-2012: Supervisor of ten diploma theses at the Department of Chemical Engineering of the University of Patras.
- 2002-2004: Teaching of two courses ("Physical Chemistry" and "Process Dynamics and Control") during the Ph.D. studies, at the Department of Chemical Engineering of the University of Patras.

RESEARCH INTERESTS AND ACTIVITIES

Research activities are focused in the fields of Heterogeneous Catalysis and Photocatalysis and, especially, in materials synthesis and characterization, (photo)catalyst development and evaluation, and investigation of reaction kinetics and mechanisms, with emphasis given in environmental and energy-related applications. Of particular interest is the investigation of the surface chemistry and structure of dispersed metallic systems and of reducible metal oxides and their mixtures.

Primary goals in the field of *Heterogeneous Catalysis* are:

- Production of hydrogen via LPG steam reforming for fuel cells applications.
- Production of hydrogen via dry reforming of methane for fuel cells applications.
- Oxidative dehydrogenation of propane with CO₂.
- Hydrogenation of CO₂ for methane production.
- Production of hydrogen for fuel cells, by reformation of biomass-derived ethanol.
- Development of water-gas shift (WGS) catalysts for fuel processors used in proton exchange membrane (PEM) fuel cell systems.
- Removal of carbon monoxide from hydrogen-rich reformate streams via selective methanation of CO.
- Water-gas shift (WGS) reaction in membrane reactors
- Catalysts development for the conversion of CO₂-H₂ mixtures into methanol and dimethylether.
- Glycerol reforming for the production of hydrogen, hydrocarbons and higher alcohols.

In the field of *Photocatalysis*, current research activities are focused on:

 Production of hydrogen by photocatalytic reforming of biomass components and derivatives at ambient conditions.

- Investigation of photocatalytic reaction mechanisms.
- Development of novel photocatalyst formulations with improved absorption characteristics in the solar spectral region.
- Photocatalytic treatment of wastewater streams containing emerging microcontaminants.

Laboratorial experience

- Design, construction and operation of experimental apparatuses and reactors for the investigation of reactions under steady state and transient conditions.
- Preparation and characterization of catalytic and solid materials employing various techniques.
- Analytical techniques:
 - √ Gas Chromatography (GC)
 - ✓ Mass Spectrometry (MS)
 - ✓ UV/Visible Spectroscopy
 - ✓ Fourier Transform Infrared Spectroscopy (FTIR)
 - ✓ Diffuse Reflectance Spectroscopy (DRS)
 - ✓ Gas Chromatography/Mass Spectrometry (GC-MS)
 - √ X-ray Diffraction (XRD)
 - ✓ TPD, TPR, TPO, Kinetic measurements
 - ✓ Techniques of measurement of total and exposed metallic surface area (BET method, selective chemisorption of gases)
 - ✓ Techniques of analytical chemistry
 - ✓ Operation and usage of laboratorial and mechanical equipment

FUNDED RESEARCH

Coordinator of **2** research project and member of the research group in **10** projects funded by EU and GSRT/HELLAS:

- "Propylene (C₃H₆) production via oxidative dehydrogenation of propane (C₃H₈) with carbon dioxide (CO₂) ODP-CO₂" Financed by Hellenic Foundation for Research & Innovation (H.F.R.I.) Budget: € 195.000, 2022-2025. (Principal Investigator)
- "Development and pilot scale demonstration of an innovative, effective and eco-friendly process for the production of clean hydrogen and electrical power generation from biogas" (project code:T1EDK-00955) Co-financed by the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH–CREATE–INNOVATE, Budget: € 208.000/€ 1.000.000, 2021-2024
- "Development and demonstration of complete process for the production of electrical energy from fuel cells through intermediate production of H₂ via LPG steam reforming" (project code:T1EDK-02442) Co-financed by the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH–CREATE–INNOVATE, Budget: € 150.000/ € 674.854,93 2018-2021 (Coordinator)

- "Production of clean hydrogen for fuel cells by reformation of bioethanol" (BIO-H2).
 ENERGY. Contract No.:ERK6-CT99-00012 (01.05.2001 31.07.2001).
- "Optimization of catalytic units of a novel process for the production of electricity from biomass for stationary applications" (PENED 2001). Contract No.: 01ED561 (2001-2005).
- "POMA-Proficient methods of liquid wastes process and gas pollutants inactivation".
 Contract No.: 03EAD13 (2003-2004).
- "Production of bio-fuels and energy with fuel cells via hydrogen". Contract No.: DEL23, (2000-2006).
- "Biomass Resource Use, Innovation and Efficiency-BRIE", Interreg III C-East, RFO, INNOREF.
- "BIOELECTRICITY: Efficient and clean production of electricity from biomass via pyrolyses oil and hydrogen utilizing fuel". Contract No.: ENK5-CT2002-00634 (2002-2005).
- "Development and Pilot Plant Demonstration of Hydrogen Production from Solar Energy and Biomass (Waste) Compounds and Derivatives at Ambient Conditions Mediated by Nanostructured Photocatalysts". E.ON Research Initiative, Contract No.: 2008/24 DCE-UoPatras (Feb2009 – Jan 2012).
- "Production of Energy Carriers from Biomass By-Products. Glycerol Reforming for the production of Hydrogen, Hydrocarbons and higher Alcohols". Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF)-Research Funding Program: Thales. Investing in knowledge society through the European Social Fund (2011-2015).
- "New catalytic processes for the production of second generation biofuels" Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF)-Research Funding Program: Thales. Investing in knowledge society through the European Social Fund (2011-2015).

PUBLICATIONS

•	International Refereed Journals:	52
•	Book Chapters	2
	For details please refer to Appendix (<u>TABLE 1</u>).	
•	Presentations in International Conferences:	45
•	Presentations in National Conferences	24

CITATIONS

•	Number of citations:	3901
•	Hirsch index (<i>h</i> parameter)	33

REFEREE IN INTERNATIONAL SCIENTIFIC JOURNALS

• Referee in 25 international scientific journals (137 articles)

REFEREE IN NATIONAL/INTERNATIONAL CONFERENCES PROCEEDINGS

- EUROPACAT-IX, Salamanca, Spain, August 30- September 4, 2009
- 1st Online Conference of Young Scientists "on" Mineral Resources-Environment-Chemical Engineering, Kozani, 26-28 February 2021

MEMBERSHIPS OF EDITORIAL BOARDS

 Guest Editor for the Special Issue on the "Advances in Biorefinery" of BioMed Research International

<u>SEMINARS – INVITED LECTURES</u>

 «Catalytic Transfer Hydrogenation for Upgrade of Furans», Web-Seminar, November 13, 2013, Catalysis Center for Energy Innovation, University of Delaware, Newark, Delaware, U.S.A.

SUPERVISION OF M.Sc./Ph.D THESES

- (a) Supervision of a Ph.D thesis of the Postgraduate Studies Program of the School of Chemical and Environmental Engineering, Technical University of Crete:
 - 1. **Alice Koka**, "Photocatalytic degradation of emerging micro-contaminants contained in wastewater streams with the use of promoted-TiO₂ catalysts" (January 2017-today).
 - 2. **Athanasios Androulakis**, "Catalytic processes of dry CH4 reforming and enrichment of syngas in H2 via the Water-gas Shift reaction" (December 2020-today).
 - 3. Alexadra Florou, "Oxidative dehydrogenation of propane with carbon dioxide"
- (b) Supervision of Master of Science (M.Sc.)
 - Diploma theses of the Postgraduate Studies Program of the School of Chemical and Environmental Engineering, Technical University of Crete:
 - 1. **Alice Koka**, "Synthseis, characterization and application of nitrogen- and silver-promoted TiO₂ catalysts" (2015-2017).
 - 2. **Maria Chatzisymeon**, "Catalytic hydrogenation of CO₂ over supported Ru and Ni catalysts" (2017-today).
 - Diploma theses of the Postgraduate Studies Program "Catalysis and Environmental Protection" of the School of Science and Technology of the Hellenic Open University:
 - 1. **loanna Kostoudi**, "Current developments in hydrogen storage in carbonaceous adsorbents" (2011-2012).
 - 2. **Chrystalla Papakonstantinou**, "Development of methods which rely on technology of membranes for the separation of CO₂ from other gases" (2012-2013).
 - 3. **Eleni Tsantefski**, "Anti-pollution technologies for the elimination of the emission of gaseous pollutants and suspended particles produced by the combustion of lignite in power plants" (2017-today).

- 4. **Spyridon Tsichlas**, "The effect of aerosols as formation of secondary atmospheric particles and ions and as effective catalysts in atmospheric chemical processes and pollution" (2018-2019).
- 5. **Anastasios Karatasos**, "Presentation of an integrated hydrogen production unit through steam reforming of natural gas" (2019-2020).

SUPERVISION OF DIPLOMA THESES

- (a) Supervision of Diploma Theses elaborated at the School of Chemical and Environmental Engineering, Technical University of Crete:
 - 1. **loanna-Idyli Betsi-Argyropoulou**, "Structural characterization and reducibility of platinum and nickel catalysts supported on mixed oxides for the reaction of selective oxidation of carbon monoxide in excess of hydrogen" (2015).
 - 2. **Valeria Stefanidi**, "Effect of operating parameters on the photocatalytic degradation of emerging micro-contaminants contained in wastewater streams with the use of silver-promoted TiO₂ catalysts" (2018).
 - 3. **Chariton Kapenekakis**, "Investigation of CO₂ methanation reaction over supported Ru and Ni catalysts" (2018).
 - 4. **Christos Valiatzas**, "Hydrogen production via steam reforming of propane over supported metal catalysts" (2018).
 - 5. **Konstantina Tsatsalidi,** "Effect of the nature of the support, metal and metallic particle size on the catalytic performance for the reaction of propane steam reforming" (2020).
 - 6. **Alexandra Florou**, «Propane steam reforming over supported Ru and Rh catalysts" (2021).
 - 7. **Konstantinos Marmanidis**, «Effect of the nature of the support and operating parameters on the production of hydrogen (H_2) via propane steam reforming reaction" (2021).
 - 8. **Ovakoglou Evaggelos**, «Hydrogen production via dry methane reforming and propane steam reforming over supported Rh and Ru catalysts" (2021).

MEMBER SELECT COMMITTEE

- **Member of a seven-member committee of one (1)** Ph.D. thesis elaborated at the Department of Chemical Engineering, University of Patras.
- Member of a five-member committee of two (2) Ph.D. theses elaborated at the Department of Chemical Engineering (School of Chemical Sciences/ Agricultural Technical School) of the University of Castilla-La-Mancha, Ciudad Real, Spain.
- **Member of a three-member committee of four (4)** Ph.D. theses which are elaborated at the School of Environmental Engineering, Technical University of Crete
- Member of a three-member committee of thirteen (13) M.Sc theses elaborated at the School of Chemical and Environmental Engineering, Technical University of Crete.
- Member of a three-member committee of thirty three (33) Diploma theses elaborated at the School of Chemical and Environmental Engineering, Technical University of Crete

PARTICIPATION IN SEMINARS:

- 2nd EFCATS School on Catalysis, "New Approaches on Catalysis Research and Catalyst Application" Tihany, Hungary, 25-29 September 2002.
- "Production of Hydrogen from conventional fuels and renewable sources", Patras, Greece, 3-11 May 2004.
- "Fuel Cells in mobile and stationary applications", Patras, Greece, 13-21 May 2004.
- "Production of Hydrogen from bio-gas, and combustion of it by using fuel cells, for production of electricity with zero emissions", Patras, Greece, 21-27 May 2004.
- "Catalytic and Photocatalytic Methods for the decomposition of liquid and gas environmental pollutants", Patras, Greece, 14-25 June 2004.
- Workshop: "Nanostructured Oxide Catalysts Prepared by Non-conventional Methods and Their Characterization", Valencia, Spain, 4-5 June 2004.
- "Exploitation of research and technological (R&T) knowledge" (PENED 2001 of GSRT/HELLAS), Patras, Greece 21 March-14 June, 2005.
- "Applications of photocatalysis and electrocatalysis on energy and environmental applications", Patras, Greece, January 2008.

LANGUAGES:

• English (First Certificate in English of University of Cambridge)

COMPUTER KNOWLEDGE

• Certificate of computer knowledge ECDL Hellas A.E (Microsoft Word XP, Microsoft Excel XP, Internet).

PROFESSIONAL MEMBERSHIPS

• Member of the Technical Chamber of Greece (T.C.G.).

LIST OF PUBLICATIONS

A. INTERNATIONAL REFEREED JOURNALS

A1. **P. Panagiotopoulou**, D.I. Kondarides, "Effect of morphological characteristics of TiO₂-supported noble metal catalysts on their activity for the Water-Gas Shift Reaction", Journal of Catalysis 225 (2004) 327-336.

https://doi.org/10.1016/j.jcat.2004.04.030

A2. **P. Panagiotopoulou**, D.I. Kondarides, "Effect of the nature of the support on the catalytic performance of noble metal catalysts for the Water-Gas Shift Reaction", Catalysis Today 112 (2006) 49-52.

https://doi.org/10.1016/j.cattod.2005.11.026

A3. **P. Panagiotopoulou**, A. Christodoulakis, D.I. Kondarides, S. Boghosian, "Particle size effects on the reducibility of titanium dioxide and its relation to the Water-Gas Shift activity of Pt/TiO₂ catalysts", Journal of Catalysis 240 (2006) 114-125.

https://doi.org/10.1016/j.jcat.2006.03.012

A4. **P. Panagiotopoulou**, D.I. Kondarides, "A comparative study of the water-gas shift activity of Pt catalysts supported on single (MO_x) and composite (MO_x/Al₂O₃, MO_x/TiO₂) metal oxide carriers", Catalysis Today 127 (2007) 319-329.

https://doi.org/10.1016/j.cattod.2007.05.010

A5. **P. Panagiotopoulou**, J. Papavasiliou, G. Avgouropoulos, T. Ioannides, D.I. Kondarides, "Water-gas Shift activity of doped Pt/CeO₂ catalysts", Chemical Engineering Journal 134 (2007) 16-22.

https://doi.org/10.1016/j.cej.2007.03.054

A6. **P. Panagiotopoulou**, D.I. Kondarides, X.E. Verykios, "Selective methanation of CO over supported noble metal catalysts: Effects of the nature of the metallic phase on catalytic performance", Applied Catalysis A: General 344 (2008) 45-54.

https://doi.org/10.1016/j.apcata.2008.03.039

A7. **P. Panagiotopoulou**, D.I. Kondarides, "Effects of alkali additives on the physicochemical characteristics and chemisorptive properties of Pt/TiO₂ catalysts", Journal of Catalysis, 260 (1) (2008) 141-149.

https://doi.org/10.1016/j.jcat.2008.09.014

A8. A.C. Basagiannis, **P. Panagiotopoulou**, X.E. Verykios, "Low temperature steam reforming of ethanol over supported noble metal catalysts", Topics in Catalysis 51(1-4) (2008) 2-12.

https://doi.org/10.1007/s11244-008-9130-z

A9. **P. Panagiotopoulou**, D.I. Kondarides, X.E. Verykios, "Selective methanation of CO over supported Ru catalysts", Applied Catalysis B: Environmental 88 (2008), 470-478.

https://doi.org/10.1016/j.apcatb.2008.10.012

A10. C.M. Kalamaras, **P. Panagiotopoulou**, D.I. Kondarides, A.M. Efstathiou, "Kinetic and mechanistic studies of the water–gas shift reaction on Pt/TiO₂ catalyst", Journal of Catalysis 264 (2009) 117-129.

https://doi.org/10.1016/j.jcat.2009.03.002

A11. **P. Panagiotopoulou**, D.I. Kondarides, "Effects of alkali-promotion of TiO₂ on the chemisorptive properties and water-gas shift activity of supported noble metal catalysts", Journal of Catalysis 267 (2009) 57-66.

https://doi.org/10.1016/j.jcat.2009.07.014

A12. **P. Panagiotopoulou**, M. Antoniadou, D.I. Kondarides, P. Lianos, "Aldol condensation products during photocatalytic oxidation of ethanol in a photoelectrochemical cell", Applied Catalysis B: Environmental 100 (2010) 124-132.

https://doi.org/10.1016/j.apcatb.2010.07.021

A13. V. Jiménez, P. Sánchez, **P. Panagiotopoulou**, J.L. Valverde, A. Romero, "Methanation of CO, CO₂ and selective methanation of CO, in mixtures of CO and CO₂, over ruthenium carbon nanofibers catalysts", Applied Catalysis A: General 390 (2010) 35-44.

https://doi.org/10.1016/j.apcata.2010.09.026

A14. **P. Panagiotopoulou**, D.I. Kondarides, "Effects of promotion of TiO₂ with alkaline earth metals on the chemisorptive properties and water-gas shift activity of supported platinum catalysts", Applied Catalysis B: Environmental 101 (2011) 738-746.

https://doi.org/10.1016/j.apcatb.2010.11.016

A15. **P. Panagiotopoulou**, D.I. Kondarides, X.E. Verykios, "Chemical reaction engineering and catalysis issues in future distributed power generation systems", Industrial and Engineering Chemistry Research 50 (2011) 523-530.

https://doi.org/10.1021/ie100132g

A16. **P. Panagiotopoulou**, D.I. Kondarides, X.E. Verykios, "Mechanistic study of the selective methanation of CO over Ru/TiO₂ catalyst: Identification of active surface species and reaction pathways", The Journal of Physical Chemistry C 115 (2011) 1220-1230.

https://doi.org/10.1021/jp106538z

A17. V. Jiménez, P. Sánchez, **P. Panagiotopoulou**, J.L. Valverde, A. Romero, "Synthesis and characterization of ruthenium supported on carbon nanofibers with different graphitic plane arrangements", Chemical Engineering Journal, 168 (2011) 947-954.

https://doi.org/10.1016/j.cej.2011.02.024

A18. V.M. Daskalaki, **P. Panagiotopoulou**, D.I. Kondarides, "Production of peroxide species in Pt/TiO₂ suspensions under conditions of photocatalytic water splitting and glycerol photoreforming", Chemical Engineering Journal.170 (2011) 433-439.

https://doi.org/10.1016/i.cei.2010.11.093

A19. **P. Panagiotopoulou**, D.I. Kondarides, X.E. Verykios, "Mechanistic aspects of the selective methanation of CO over Ru/TiO₂ catalyst", Catalysis Today 181 (2012) 138-147.

https://doi.org/10.1016/j.cattod.2011.05.030

A20. H. Dimitroula, V.M. Daskalaki, Z. Frontistis, D.I. Kondarides, **P. Panagiotopoulou**, N.P. Xekoukoulotakis, D. Mantzavinos, "Solar photocatalysis in Pt/TiO₂ suspensions for the abatement of emerging micro-contaminants in wastewater", Applied Catalysis B: Environmental 117-118 (2012) 283-291.

https://doi.org/10.1016/j.apcatb.2012.01.024

A21. M. Antoniadou, **P. Panagiotopoulou**, D.I. Kondarides, P. Lianos, "Photocatalysis and photoelectrocatalysis using nanocrystalline titania alone or combined with Pt, RuO₂ or NiO co-catalysts", Journal of Applied Electrochemistry 42 (9) (2012) 737-743.

https://doi.org/10.1007/s10800-012-0408-2

A22. **P. Panagiotopoulou**, X.E. Verykios, "Mechanistic aspects of the low temperature steam reforming of ethanol over supported Pt catalysts", International Journal of Hydrogen Energy, 37 (21) (2012) 16333-16345.

https://doi.org/10.1016/j.ijhydene.2012.02.087

A23. J. Sutton, **P. Panagiotopoulou**, X. Verykios, D.G. Vlachos, "Combined DFT, Microkinetic, and Experimental Study of Ethanol Steam Reforming on Pt", The Journal of Physical Chemistry C 117 (9) (2013) 4691-4706.

https://doi.org/10.1021/jp312593u

A24. **P. Panagiotopoulou**, E.E. Karamerou, D.I. Kondarides, "Kinetics and mechanism of glycerol photo-oxidation and photo-reforming reactions in aqueous TiO₂ and Pt/TiO₂ suspensions". Catalysis Today 209 (2013) 91-98.

https://doi.org/10.1016/j.cattod.2012.09.029

A25. **P. Panagiotopoulou**, C. Papadopoulou, H. Matralis, X. Verykios, "Production of renewable hydrogen by reformation of biofuels", Wiley Interdisciplinary Reviews: Energy and Environment, 3 (3) (2014) 231-253.

https://doi.org/10.1002/wene.93

A26. **P. Panagiotopoulou**, N. Martin, D.G. Vlachos, "Effect of hydrogen donor on liquid phase catalytic transfer hydrogenation of furfural over a Ru/C catalyst", Journal of molecular catalysis A: Chemical 392 (2014) 223-228.

https://doi.org/10.1016/j.molcata.2014.05.016

A27. S.S. Akarmazyan, **P. Panagiotopoulou**, A. Kambolis, C. Papadopoulou and D.I. Kondarides, "Methanol dehydration to dimethylether over Al₂O₃ catalysts". Applied Catalysis B: Environmental 145 (2014) 136-148.

https://doi.org/10.1016/j.apcatb.2012.11.043

A28. G.N. Nomikos, **P. Panagiotopoulou**, D.I. Kondarides and X.E. Verykios, "Kinetic and mechanistic study of the photocatalytic reforming of methanol over Pt/TiO₂ catalyst", Applied Catalysis B: Environmental 146 (2013) 249-257.

https://doi.org/10.1016/j.apcatb.2013.03.018

A29. **P. Panagiotopoulou**, D.G. Vlachos, Liquid Phase Catalytic Transfer Hydrogenation of Furfural Over Ru/C Catalyst, Applied Catalysis A: General 480 (2014) 17-24.

https://doi.org/10.1016/j.apcata.2014.04.018

A30. M. Kourtelesis, **P. Panagiotopoulou**, S. Ladas, X.E. Verykios "Influence of the support on the reaction network of ethanol steam reforming at low temperatures over Pt catalysts". Topics in Catalysis 58 (18) (2015) 1202-1217.

https://doi.org/10.1007/s11244-015-0485-7

A31. A.V. Mironenko, M.J. Gilkey, **P. Panagiotopoulou**, G. Facas, D.G. Vlachos, B. Xu "Ring Activation of Furanic Compounds on Ruthenium-Based Catalysts" J. Phys. Chem. C, 2015, *119* (11), pp 6075–6085.

https://doi.org/10.1021/jp512649b

A32. I. V. Yentekakis, G. Goula, P. Panagiotopoulou, A. Katsoni, E. Diamadopoulos, D. Mantzavinos, A. Delimitis "Dry Reforming of Methane: Catalytic Performance and Stability of Ir Catalysts Supported on γ-Al₂O₃, Zr_{0.92}Y_{0.08}O_{2-δ} (YSZ) or Ce_{0.9}Gd_{0.1}O_{2-δ} (GDC) Supports". Topics in Catalysis 58 (18) (2015) 1228-1241.

https://doi.org/10.1007/s11244-015-0490-x

A33. M.J. Gilkey, **P. Panagiotopoulou**, A.V. Mironenko, G.R. Jenness, D.G. Vlachos, B. Xu "Mechanistic Insights into Metal Lewis Acid-Mediated Catalytic Transfer Hydrogenation of Furfural to 2-Methylfuran" ACS catalysis 5 (2015) 3988-3994.

https://doi.org/10.1021/acscatal.5b00586

A34. **P. Panagiotopoulou**, N. Martin, D.G. Vlachos "Liquid phase catalytic transfer hydrogenation of furfural over homogeneous Lewis acid-Ru/C catalysts" ChemSusChem, 8 (12) (2015) 2046-2054.

https://doi.org/10.1002/cssc.201500212

Panagiotopoulou, P., Martin, N. and Vlachos, D. G. (2015), <u>Inside Cover</u>: Liquid-Phase Catalytic Transfer Hydrogenation of Furfural over Homogeneous Lewis Acid–Ru/C Catalysts (ChemSusChem 12/2015). ChemSusChem, 8: 1990. doi:10.1002/cssc.201500748

https://doi.org/10.1002/cssc.201500748

A35. M.Kourtelesis, **P. Panagiotopoulou**, X.E. Verykios "Influence of structural parameters on the reaction of low temperature ethanol steam reforming over Pt/Al₂O₃ catalysts" Catalysis Today 258 (2015) 247-255.

https://doi.org/10.1016/j.cattod.2014.12.035

A36. I.V. Yentekakis, G. Goula, **P. Panagiotopoulou**, S. Kampouri, M.J. Taylor, G. Kyriakou, R.M. Lambert "<u>Stabilization of catalyst particles against sintering on oxide supports with high oxygen ion lability exemplified by Ir-catalyzed decomposition of N₂O" Applied Catalysis B: Environmental 192 (2016) 357-364.</u>

https://doi.org/10.1016/j.apcatb.2016.04.011

A37. **P. Panagiotopoulou**, "Hydrogenation of CO₂ over supported noble metal catalysts" Applied Catalysis A: General 542 (2017) 63-70.

https://doi.org/10.1016/j.apcata.2017.05.026

A38. **P. Panagiotopoulou**, X.E. Verykios, "Mechanistic Study of the Selective Methanation of CO over Ru/TiO₂Catalysts: Effect of Metal Crystallite Size on the Nature of Active Surface Species and Reaction Pathways" The Journal of Physical Chemistry C *121* (9) (2017) 5058–5068.

https://doi.org/10.1021/acs.jpcc.6b12091

A39. M.A Goula, N.D. Charisiou, G. Siakavelas, L. Tzounis, I. Tsiaoussis, **P. Panagiotopoulou**, G. Goula, I.V. Yentekakis "Syngas production via the biogas dry reforming reaction over Ni supported on zirconia modified with CeO₂ or La₂O₃ catalysts, ", International Journal of Hydrogen Energy 42 (19) (2017) 13724-13740.

https://doi.org/10.1016/j.ijhydene.2016.11.196

A40 I. V. Yentekakis, G. Goula, S. Kampouri, I. Betsi-Argyropoulou, **P. Panagiotopoulou**, M. J. Taylor, G. Kyriakou, R. M. Lambert "Ir-Catalysed Nitrous oxide (N_2O) Decomposition: Effect of Ir Particle Size and Metal–Support Interactions" Catalysis Letters 148 (1) (2017) 341-347 .

https://doi.org/10.1007/s10562-017-2233-z

A41. A. Petala, **P. Panagiotopoulou** "Methanation of CO₂ over alkali-promoted Ru/TiO₂ catalysts: I. Effect of alkali additives on catalytic activity and selectivity", Applied Catalysis B: Environmental 224 (2018) 919-927.

https://doi.org/10.1016/j.apcatb.2017.11.048

A42. **P. Panagiotopoulou** "Methanation of CO₂ over alkali-promoted Ru/TiO₂ catalysts: II. Effect of alkali additives on the reaction pathway", Applied Catalysis B: Environmental 236 (2018) 162-170.

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Notes

Article A1 was among the 25 Hottest Articles of Journal of Catalysis for the period of July-September 2004.

http://top25.sciencedirect.com/subject/chemical-engineering/5/journal/journal-of-catalysis/00219517/archive/1/

Article A2 was among the Most Cited Articles of Catalysis Today for various periods.

<u>Article A3 και A10</u> were among the 25 Hottest Articles of Journal of Catalysis for the period of April-September 2009.

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Article A4 was among the 25 Hottest Articles of Chemical Engineering Journal for the period of October-December 2007.

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<u>Article A17</u> was among the Top Cited Papers of Chemical Engineering Journal for 2011 and 2012 http://www.journals.elsevier.com/chemical-engineering-journal/highlighted-articles/congratulations-to-our-most-cited-authors-2011-2012cej/

Article A28 was among the 25 Hottest Articles of Applied Catalysis A for the period of July-September 2014.

http://top25.sciencedirect.com/subject/chemical-engineering/5/journal/applied-catalysis-ageneral/0926860X/archive/53/

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B. BOOK CHAPTERS

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C. PRESENTATIONS IN INTERNATIONAL CONFERENCES

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- C2. P. Panagiotopoulou and D.I. Kondarides, "Effects of Physicochemical and Morphological Properties of Supported Noble Metal Catalysts on their Activity for the Water-Gas Shift Reaction", 13th International Congress on Catalysis, Paris, 11-16 July 2004.
- C3. P. Panagiotopoulou and D.I. Kondarides, "Effect of the nature of the support on the catalytic performance of noble metal catalysts for the Water-Gas Shift Reaction", 1st Conference of the Coordination Action CONCORDE, CO-ordination of Nanostructured Catalytic Oxides Research and Development in Europe, Louvain-la-Neuve (Belgium), January 26-28, 2005.
- C4. P. Panagiotopoulou and D.I. Kondarides, "Development of efficient low-temperature Water-Gas Shisf catalysts suitable for fuel cell applications", The Hydrogen Power Theoretical and Engineering Solutions International Symposium, HYPOTHESIS VI, Habana City, Cuba, 08-12 May, 2005.
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- C9. P. Panagiotopoulou and D.I. Kondarides, "Identification of Key Physicochemical Parameters which Determine the Water-Gas Shift Activity of Oxide-Supported Platinum Catalysts", EUROPACAT VIII, Turku, Finland, August 26-31, 2007.
- C10. P. Panagiotopoulou, D.I. Kondarides and X.E. Verykios, "Selective Methanation of CO over Supported Noble Metal Catalysts", EUROPACAT VIII, Turku, Finland, August 26-31, 2007.
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- C12. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios, "Selective methanation of CO over supported noble metal catalysts", EUROPACAT IX, Salamanca, Spain, Aug. 30 Sep.4, 2009.
- C13. P. Panagiotopoulou, X.E. Verykios, "WGS reaction in a membrane reactor" EUROPACAT-IX, Salamanca, Spain, Aug. 30 Sep.4, 2009.

- C14. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios "Chemical Reaction Engineering & Catalysis in Future Distributed Power Generation Systems" New Frontiers in Chemical & Biochemical Engineering in Honor of Professors Anastasios Karabelas and Stavros Nychas, Thessaloniki, Greece, November 26-27, 2009.
- C15. V.M. Daskalaki, P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios,"Production of hydrogen by photocatalytic reforming of biomass components and derivatives in aqueous Pt/TiO₂ suspensions", Catalysis for renewable sources: Fuel, Energy, Chemicals, St. Petersburg, Russia, June 28 Luly 2, 2010.
- C16. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios "Low temperature steam reforming of ethanol over supported noble metal catalysts", International Conference on Hydrogen Production (ICH2P-2011), Thessaloniki, Greece, June 19 -22, 2011.
- C17. M. Antoniadou, P. Panagiotopoulou, D.I. Kondarides, P. Lianos, "Photocatalysis and photoelectrocatalysis using nanocrystalline titania alone or combined with Pt, RuO₂ or NiO co-catalysts", 9th European Symposium on Electrochemical Engineering (9th ESEE), Chania, Crete, Greece, June 19 23, 2011.
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- C19. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios, "Mechanistic aspects of the selective methanation of CO over Ru/TiO₂ catalyst", EUROPACAT-X, Glasgow, Scotland, Aug. 28 Sep, 2011.
- C20. P. Panagiotopoulou, X.E. Verykios, "Efficient Production of Renewable Hydrogen by Reformation of Ethanol at Low Temperature", World Hydrogen Energy Conference 2012 Toronto, 3-7 June, 2012.
- C21. P. Panagiotopoulou, D.I. Kondarides, "Kinetics and mechanism of glycerol photo-oxidation and photo-reforming reactions in aqueous TiO₂ and Pt/TiO₂ suspensions" 7th European Meeting on Solar Chemistry and Photocatalysis: Environmental Applications /SPEA7, Porto, Portugal, June 17-20, 2012.
- C22. M. Antoniadou, P. Panagiotopoulou, D.I. Kondarides, P. Lianos, "Photoelectrocatalysis using nanocrystalline titania alone or combined with various co-catalysts" 7th European Meeting on Solar Chemistry and Photocatalysis: Environmental Applications /SPEA7, Porto, Portugal, June 17-20, 2012.
- C23 P. Panagiotopoulou, X.E. Verykios, "Low temperature steam reforming of ethanol over supported Pt catalysts", CAT4BIO Conference, Advances in catalysis for biomass valorization, Thessaloniki, July 8-11, 2012.
- C24. P. Panagiotopoulou, X.E. Verykios, "Low temperature steam reforming of ethanol over supported Pt catalysts", 7th International Conference on Environmental Catalysis, Lyon, France, September 2-6, 2012.
- C25. G.N. Nomikos, P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios, "Kinetic and mechanistic study of the photocatalytic reforming of methanol over Pt/TiO₂ catalyst", 7th International Conference on Environmental Catalysis, Lyon, France, September 2-6, 2012.

- C26. P. Panagiotopoulou, X.E. Verykios, "Low temperature steam reforming of ethanol over supported noble metal catalysts", Catalysis Club of Philadelphia annual poster contest, October 18th, 2012, Wilmington, U.S.A.
- C27. P. Panagiotopoulou and D.G. Vlachos, "Liquid Phase Catalytic Transfer Hydrogenation of Furfural Over Ru/C Catalyst", Science for our Nation's Energy Future, Energy Frontier Research Centers Principal Investigator's Meeting, July 18-19, 2013, Washington, D.C., U.S.A.
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- C30. M. Kourtelesis, P. Panagiotopoulou and X.E. Verykios, Support and crystallite size effects of Pt catalysts for the low temperature steam reforming of ethanol, 13th International Conference on Clean Energy 2014 (ICCE 2014) June 8-12, 2014 Istanbul, Turkey.
- C31. P. Panagiotopoulou, X.E. Verykios, Structural and mechanistic aspects of low temperature steam reforming of ethanol over supported Pt catalysts. 8th International Conference on Environmental Catalysis (ICEC 2014), Asheville, North Carolina August 24-27 2014.
- C32. N. Martin, P. Panagiotopoulou and D.G. Vlachos, Liquid phase catalytic transfer hydrogenation of furfural over homogeneous Lewis acid-Ru/C catalysts, Catalysis Club of Philadelphia annual poster contest, October 16th, 2014, Wilmington, Delaware, U.S.A.
- C33. B. Xu, D.G. Vlachos, P. Panagiotopoulou and M. Gilkey, Mechanistic studies on hydrodeoxygenation of furfural to 2-Methyl furan via ring C-H bond activations, 14AlChE Annual Meeting, Atlanta, GA, USA November 16-21, 2014.
- C34. M.J. Gilkey, P. Panagiotopoulou, B. Xu, D.G. Vlachos, Mechanistic Investigation of the Hydrodeoxygenation of Furfural to 2-methylfuran over Ru/C Using Isotopic Labeling Techniques, 24th North American Catalysis Society Meeting, Pittsburgh, Pennsylvania. June 14-19, 2015.
- C35. R.E. Patet, P. Panagiotopoulou, S. Caratzoulas, D.G. Vlachos "Dehydration Reactions in Lewis Acidic Zeolites" 15AIChE Annual Meeting, Salt Lake City, UT, USA November 8-13, 2015.
- C36. M. Kourtelesis, P. Panagiotopoulou and X.E. Verykios, "Influence of the support on the reaction network of ethanol steam reforming at low temperatures over Pt catalysts", French Conference on Catalysis (FCCat), 23-27 May 2016. Freius, France.
- C37. M.A Goula, G. Siakavelas, K.N. Papageridis, N.D. Charisiou, P. Panagiotopoulou, and I.V. Yentekakis "Syngas production via the biogas dry reforming reaction over Ni supported on zirconia modified with CeO2 or La2O3 catalysts" 21st World Hydrogen Energy Conference 2016, June 13-16, 2016 Zaragoza, Spain.
- C38. I.V. Yentekakis, G. Goula, P. Panagiotopoulou, S. Kampouri, M.J. Taylor, G. Kyriakou and R.M. Lambert, "Iridium catalyzed N₂O decomposition: Effect of the Iridium particle size and metal-support interactions" Crete 2016, September 27-30, 2016, Chania, Greece.

- C39. T. Makropoulou, P. Panagiotopoulou, D. Venieri "N-doped TiO₂ photocatalysts for bacterial inactivation in water" 5th European conference on environmental applications of advanced oxidation processes June 25-29, 2017, Prague, Czech Republic.
- C40.A. Kokka, **P. Panagiotopoulou**, E. Diamadopoulos, "Photocatalytic degradation of emerging organic contaminants over nitrogen and silver doped TiO₂ catalysts" 6th International Conference on Industrial and Hazardous Waste Management, September 4-7, 2018, Chania, Greece.
- C41. A. Kokka, **P. Panagiotopoulou**, "Hydrogen production via steam reforming of LPG over supported metal catalysts", 14th European Congress on Catalysis, EuropaCat 2019, 18-23 August, 2019, Aachen, Germany.
- C42. A. Kokka, I.V. Yentekakis, **P. Panagiotopoulou**, "Effects of physicochemical properties of supported metal catalysts on their activity for the production of H₂ via steam reforming of propane", 11th International Conference on Environmental Catalysis, 6-9 September 2020, Manchester, UK.
- C43. A. Kokka, **P. Panagiotopoulou**, "Effect of operating conditions on the catalytic performance of supported Rh catalysts for the reaction of LPG steam reforming", 11th International Conference on Environmental Catalysis, 6-9 September 2020, Manchester, UK.
- C44. A. Kokka, T. Ramantani, I.V. Yentekakis and **P. Panagiotopoulou**, "A comparative study of propane and propane/butane steam reforming activity of Rh catalysts supported on composite M_xO_y-Al₂O₃ carriers" *5th EuChemS Conference on Green and Sustainable Chemistry*, 26th 29th September 2021 Virtual Conference.
- C45. A. Kokka, T. Ramantani, I.V. Yentekakis and **P. Panagiotopoulou**, "Effect of alkali promotion on the activity of ru/tio₂ catalysts for the production of H₂ via propane steam reforming" 12th International Conference on Hydrogen Production, Hydrogen for a green future (ICH2P-2021 On-line conference), September 19-23, 2021.

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- D1. P. Panagiotopoulou and D.I. Kondarides, "Development of novel catalytic materials for the Low temperature Water-Gas Shift reaction", 4th Pan-Hellenic scientific conference of Chemical Engineering, Patras, 29-31 May, 2003.
- D2. P. Panagiotopoulou and D.I. Kondarides, "Effect of Physicochemical characteristics of supported noble metal catalysts on their activity for the Water-Gas Shift reaction", 8th Pan-Hellenic Symposium of Catalysis, Agia Napa – Cyprus, 30 October - 1 November 2004.
- D3. P. Panagiotopoulou and D.I. Kondarides, "Kinetic study of the Water-Gas Shift reaction over Pt catalyst supported on TiO₂", 5th Pan-Hellenic scientific conference of Chemical Engineering, Thessalonica Greece, 26-28 May, 2005.
- D4. P. Panagiotopoulou and D.I. Kondarides, "Effect of the addition of promoters over Pt/TiO₂ catalysts on their activity for the Water-Gas Shift reaction", 9th Pan-Hellenic Symposium of Catalysis, Lefkas Greece, 6-7 October, 2006.

- D5. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios "Selective Methanation of CO over Supported Noble Metal Catalysts". 6th Pan-Hellenic scientific conference of Chemical Engineering, Athens Greece, 31 May-2 June, 2007.
- D6. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios "Selective Methanation of CO over Supported Noble Metal Catalysts", 3nd National Conference of Hydrogen Technology, Patras

 – Greece, 19-20 November 2007.
- D7. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios "Selective Methanation of CO over Supported Noble Metal Catalysts", 10th Pan-Hellenic Symposium of Catalysis, Metsovo Greece, 2-3 October, 2008.
- D8. P. Panagiotopoulou and X.E. Verykios, "WGS reaction in a membrane reactor", 7th Pan-Hellenic scientific conference of Chemical Engineering, Patras Greece, 3-4 June, 2009.
- D9. P. Panagiotopoulou, D.I. Kondarides, X.E. Verykios "Mechanistic study of the selective methanation of CO over 5%Ru/TiO₂ catalyst", 11th Pan-Hellenic Symposium of Catalysis, Athens 22-23 October, 2010.
- D10. E. Filipaiou, P. Panagiotopoulou, D.I. Kondarides, "Photocatalytic activity of doped TiO₂ catalysts for the reactions of glycerol oxidation and reforming" 11th Pan-Hellenic Symposium of Catalysis, Athens 22-23 October, 2010.
- D11. S.S. Akarmazyan, P. Panagiotopoulou, A. Kambolis, Ch. Papadopoulou, D.I. Kondarides, "Methanol dehydration to dimethylether over Al₂O₃-based catalysts", 11th Pan-Hellenic Symposium of Catalysis, Athens 22-23 October, 2010.
- D12. A. Petala, P. Panagiotopoulou, D.I. Kondarides, M. Antoniadou, P. Lianos, "Photocatalysis and Photoelectrocatalysis of Nitrogen doped TiO2 catalysts", 12th Panhellenic Catalysis Symposium, Chania 25-27 October, 2012.
- D13. P. Panagiotopoulou and D. G. Vlachos, "Liquid Phase Catalytic Transfer Hydrogenation of Furfural over a Ru/RuO₂/C Catalyst", 13th Panhellenic Catalysis Symposium, Palaios Agios Athanasios, 16-18 October, 2014.
- D14. M.Kourtelesis, P. Panagiotopoulou, X.E. Verykios, "Influence of structural parameters of Pt/Al₂O₃ catalyst on ethanol steam reforming reaction at low temperatures", 10th Pan-Hellenic scientific conference of Chemical Engineering, Patras, 4-6 June, 2015.
- D15. G. Goula, A. Katsoni, S. Fanouriakis, G. Palioudaki, C. Papageorgiou, P. Panagiotopoulou, E. Diamantopoulos, I. Yentekakis, "Dry biogas reforming: Effect of the nature of the support on the catalytic performance of single- and bi-metallic iridium catalysts", 10th Pan-Hellenic scientific conference of Chemical Engineering, Patras, 4-6 June, 2015.
- D16. M. Goula, G.I. Siakavelas, N.D. Charisiou K.N. Papageridis, D.G. Avraam, P. Panagiotopoulou, I.V. Yentekakis "Syngas production via the biogas dry reforming reaction over Ni supported on zirconia modified with CeO₂ or La₂O₃ catalysts. 14th Panhellenic Catalysis Symposium, Patras, 13-15 October, 2016.
- D17. I.V. Yentekakis, G. Goula, I. Betsi-Argyropoulou, M. Chatzisymeon, P. Panagiotopoulou, K. Kousi, D.I. Kondarides, M. Taylor, G. Kyriakou, R.M. Lambert, «Biogass reforming over supported Iridium catalysts: The effect of CeO₂ on the catalytic performance and stability", 14th Panhellenic Catalysis Symposium, Patras, 13-15 October, 2016.
- D18. G. Goula, I. Betsi-Argyropoulou, M. Chatzisymeon, P. Panagiotopoulou, K. Kousi, D.I. Kondarides, M. Taylor, G. Kyriakou, R.M. Lambert, I.V. Yentekakis «Investigation of

- activity, stability and carbon deposition over Rh supported catalysts for the dry reforming of methane", 14th Panhellenic Catalysis Symposium, Patras, 13-15 October, 2016.
- D19. P. Panagiotopoulou "Investigation of the effect of structural characteristics of metal for the reaction of carbon dioxide hydrogenation" 11th Pan-Hellenic scientific conference of Chemical Engineering, Thessaloniki, 25-27 May, 2017.
- D20. **P. Panagiotopoulou**, A. Petala «CO₂ methanation over alkali promoted Ru/TiO₂ catalysts: Effect of alkali addition on catalytic activity and reaction pathway» 15th Panhellenic Catalysis Symposium, Ioannina, 18-21 October, 2018.
- D21. M. Hatzisymeon, A. Petala, **P. Panagiotopoulou**, "Effect of the nature of the support on the activity of supported Ni catalysts for the CO2 hydrogenation reaction" 15th Panhellenic Catalysis Symposium, Ioannina, 18-21 October, 2018.
- D22. A. Kokka, **P. Panagiotopoulou**, "Hydrogen production via propane steam reforming reaction over supported metal catalysts" 12° Pan-Hellenic scientific conference of Chemical Engineering, Athens, 29-31 May, 2019.
- D23. A. Kokka, T. Ramantani, A. Petala, **P. Panagiotopoulou**, "Effect of the nature of the support, operating and pretreatment conditions on the catalytic performance of supported Ni catalysts for the reaction of the selective methanation of CO" 12° Pan-Hellenic scientific conference of Chemical Engineering, Athens, 29-31 May, 2019.
- D24. A. Kokka, T. Ramantani, **P. Panagiotopoulou**, "Effect of operating parameters on the activity and stability of 0.5%Rh/TiO₂ in structured or not form for the reaction of LPG steam reforming", 1st Online Conference of Young Scientists on "Mineral Resources-Environment-Chemical Engineering, 26-28 February 2021, Kozani.

APPENDIX

TABLE 1. Publications in refereed journals and impact factors (*).

Journal	Impact Factor (2016)	Number of articles	Article code
Applied Catalysis B: Environmental	19.503	10	A9, A12, A14, A20, A27, A28, A36, A41, A42, A49
ACS Catalysis	13.084	1	A33
Chemical Engineering Journal	13.273	3	A5, A17, A18
ChemSusChem	8.928	1	A34
Journal of Catalysis	7.920	5	A1, A3, A7, A10, A11
Catalysis Today	6.766	6	A2, A4, A19, A24, A35, A44
Applied Catalysis A	5.706	5	A6, A13, A29, A37, A45
International Journal of Hydrogen Energy	5.816	3	A22, A39, A46
Nanamaterials	5.076	1	A50, A52
Journal of Molecular Catalysis A	4.397	1	A26
Catalysts	4.146	1	A48
The Journal of Physical Chemistry C	4.126	4	A16, A23, A31, A38
Industrial & Engineering Chemistry Research	3.720	1	A15, A51
Wiley Interdisciplinary Reviews: Energy and Environment	3.803	1	A25
Journal of Chemical Technology and Biotechnology	3.174	1	A43
Catalysis Letters	3.186	2	A40, A47
Topics in Catalysis	2.910	3	A8, A30, A32
Journal of Applied Electrochemistry	2.800	1	A21

 $^{^{(*)}}$ Source: ISI Web of Knowledge.