

CURRICULUM VITAE OF NIKOLAS KIRATZIS

Current Address: Department of Mineral Resources Engineering, School of Engineering, University of Western Macedonia, Kila, Kozani 50100 Greece. Tel.: 0030-24610- 68143, e-mail:

kiratzis@teiwm.gr

Education:

Ph.D. in Chemical Engineering, Tufts University, Medford, MA 02155 1987-1991

Specialization: Ceramic fuel cells and heterogeneous catalysis

Thesis title: Production of HCN in a solid electrolyte cell

- Full tuition scholarship from Tufts University in addition to subsistence stipend. Funding was provided from the National Science Foundation and the DuPont chemical company.
- I showed the feasibility of a new processing route for hydrogen cyanide from CH_4 , NH_3 and O_2 on Pt/Rh catalysts in an yttria stabilized zirconia electrolyte ceramic cell.
- Mathematical modeling of the system for performance prediction for different reactor designs

MSc in Chemical Engineering, Tufts University, Medford, MA 02155 1984-1987

- Full tuition scholarship from Tufts University in addition to subsistence stipend. Funding was provided from the Department of Energy.

Postgraduate courses (grades): Process Dynamics and Control (A-), Advanced Transport Phenomena (A-), Advanced Thermodynamics (Exergy Analysis) (A), Mathematical Methods in Chemical Engineering (A+), Polymer Chemistry and Engineering (B-), Flow of Viscous Fluids (B+), Chemical and Catalytic Reaction Engineering (A), Electrochemical Processes (B+)

Diploma in Chemical Engineering, University of Patra, Patra, Greece 1979-1984

Student Scholarship (State Scholarships Foundation-IKY) during academic years 1979- 80,1980-81

Research projects:

- Modeling of the combustion of CO in a monolith ceramic fuel cell
 - Set-up and prediction of performance of a double tube heat-exchanger
 - Student Industrial Placement: Esso-Exxon (E.K.O.) ,Thessaloniki, Greece in summer 1983
- Research project: Effect of internal and external lubricant additives on the rheological behavior of PVC resins

Academic Experience:

May 2019-present: Professor of Electrochemistry, University of Western Macedonia, School of Engineering, Department of Mineral Resources Engineering

- Responsible for the organization and teaching of the courses: Principles of Chemistry, Thermodynamics, Transport Phenomena, Materials Science, Electrochemical Engineering and Mineral Resources & Ceramic Fuel Cells

November 1998-May 2019: Professor of Electrochemistry, Western Macedonia University of Applied Sciences, School of Technological Applications, Department of Environmental and Pollution Control Engineering

- Responsible for the organization and curriculum development of the Technology of Materials, Clean Energy Production Technologies, Thermodynamics, Transport Phenomena and Fluid Mechanics.

(Former) Department of Applied Sciences

- Responsible for the organization and teaching of Electrochemistry and Introduction to Fuel Cells in the Department of Electrical Engineering. Development of Undergraduate Electrochemistry and Chemistry Laboratory. Teaching of Chemistry and Physical Chemistry.
- Responsible for the “Laboratory of Advanced Materials and Electrochemical Technology(LAMET)” in the Technological Research Center (TRC) of TEI of West Macedonia.

- Conducting the Undergraduate Laboratories of Quality Control and Technology of Materials (QCTM) and Chemistry
- Scientific Director : “Complementary Educational Equipment for the Department of Applied Sciences at TEI of West Macedonia”
Funding: Ministry of Education and Religious Affairs of Greece and EU (160.686 Euros).

Research experience:

22/4/2019-31/8/2020

Principal Investigator –Western Macedonia University of Applied Sciences

Title: Theoretical and Experimental Optimization of the Solution Spray Pyrolysis Technique for fabrication of Thin Ceramic Films (5,000 Euros)

Funding: Special Research Account Committee of the Western Macedonia University of Applied Sciences (ELKE, TEIWM, Grant number: 80305)

1/9/2016-28/2/2018

Principal Investigator –Western Macedonia University of Applied Sciences

Title: Fabrication and Characterization of Electrodes and Electrolytes for the Electrochemical Oxidation of Hydrocarbons in Solid Oxide Fuel Cells (5,500 Euros)

Funding: Special Research Account Committee of the Western Macedonia University of Applied Sciences (ELKE, TEIWM, Grant number: 80143)

01/10/2012 to 31/12/2015:

Principal Investigator -TEI of W. Macedonia

Archimedes III: Support of research teams at Technological Education Institutes (TEIs)

Title: “Optimization of fabrication processes of solid electrolyte fuel cell components for the direct electrochemical oxidation of hydrocarbons” (100,000 Euros)

Funding: Ministry of Education, Life-Long Learning and Religious Affairs, European Union-European Commission

Special Managing Authority of Operational Program

Operational Program: Education and Life-long Learning

01/10/2005 to 30/9/2008:

Principal Investigator -TEI of W. Macedonia

Operational Program "Competitiveness" (Coordinator: University of West Macedonia)

Title: “Catalytic and Electrocatalytic reduction of NOx with simultaneous oxidation of hydrocarbons in the flue gases of Power Plants” (3500 Euros)

Funding: General Secretariat for Research and Technology (GSRT)

01/01/2004 to 31/12/2007:

Principal Investigator -TEI of W. Macedonia

Archimedes: Support of research teams at Technological Education Institutes (TEIs)

Title: “Development of Solid Electrolyte Fuel Cell Systems for the direct electrochemical oxidation/dehydrogenation of hydrocarbons” (52,351 Euros)

Funding: Ministry of Education, Life-long Learning and Religious Affairs

Special Managing Authority of Operational Programs

Operational Program: Education and Initial Vocational Training (O.P.E.I.V.T. II)

July-September 2005:

Visiting Researcher-School of Chemistry, University of St. Andrews, St. Andrews, Fife KY 16 9ST, Scotland, UK

Title: “Improvement in fuel electrode performance in high temperature fuel cells”

Funding :The Royal Society, UK

Royal Society, UK, National Hellenic Research Foundation, International Travel Grants.

Collaborator: Prof. J.T.S. Irvine, School of Chemistry, University of St. Andrews, St. Andrews, Fife KY 16 9ST, Scotland, UK

01/01/2004 to 31/12/2007:

Collaborator- TEI of W. Macedonia

Archimedes: Support of research teams at Technological Education Institutes (TEIs)

Title: “Study of the characteristics of particulate pollution in urban areas close to coal mines and electrical power plants: investigation of their toxicity and health effects on the inhabitants”

Funding: Ministry of Education, Life-long Learning and Religious Affairs

Special Managing Authority of Operational Programs

Operational Program Education and Initial Vocational Training (O.P.E.I.V.T. II)

2000-2002:

Post-doctoral researcher, Harvard University

Center for Engineering in Medicine, Shriners Hospital for Children, Boston, MA 02114

Programs:

1. Early Response Genes in the Induction and Maintenance of Post-burn Hypermetabolism

2. Hepatic Tissue Engineering

Funding: Shriners Hospital for Children, National Institute of Health (NIH), USA

- Investigation of the metabolic mechanism of hepatic cells in vitro for the development of artificial liver

1999-2004:

Participating Researcher- TEI W. Macedonia

European Collaboration Program titled: «Optimization of Solid State Electrochemical Processes for Hydrocarbon Oxidation (OSSEP) »

Funding: European Science Foundation (ESF)

Collaborators: University of St. Andrews (Scotland), Technological University of Munich and Riso National Laboratory (Denmark).

- Research on the development of novel anodic electrodes for ceramic electrolyte fuel cells for the direct oxidation of hydrocarbons.

1997-1998:

Post-doctoral Research Fellow, Imperial College of Science, Technology and Medicine, Department of Chemical Engineering, London SW5 2BY

Title: Intensive Structuring Project Microstructure of Concentrated Surfactant Solutions

Funding: Unilever Research, Port Sunlight Laboratory, UK

- Investigation of the rheological behavior and microstructural transitions of the liquid crystal phases of concentrated cationic surfactant solutions.

1996-1997:

Post-doctoral Research Fellow, Imperial College of Science, Technology and Medicine, Department of Chemical Engineering, London SW5 2BY

Title: Rheology of Ceramic Dispersions

Funding: Engineering and Physical Sciences Research Council (EPSRC)

- Research on the rheology of colloidal sterically stabilized aqueous alumina dispersions in presence of hydroxyethyl cellulose-Investigation of the flocculation mechanism.

1994-1996:

Post-doctoral Research Fellow, Imperial College of Science, Technology and Medicine, Department of Materials, London SW5 2BP, UK

Title: Development of Intermediate Temperature Solid Electrolyte Fuel Cells

Funding: European Collaboration Human Capital Mobility Network,

Partners: Lies Enseeg, Grenoble, FR -Univ. Of Aveiro, PT-Univ. Of Karlsruhe, DE

-Univ. Of Delft, NL-ECN, Petten, NL-Siemens, Munich, DE- Innovision, Odense, DK

- Exploration of the potential of flame assisted and electrostatic spray pyrolysis process for thin ceramic film (CeO_2 -10% Gd_2O_3) structures. Investigation of the potential of electrostatic spray pyrolysis for the deposition of thin cathodic films ($\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.2}\text{Fe}_{0.8}\text{O}_{3-x}$) on ceria-gadolinia pellets.
- Research on anode electrochemical behaviour for the development of intermediate temperature (500-700°C) ceramic cells based on Ceria-Gadolinia electrolytes for incorporation in electric vehicles using methanol as fuel.

1992:

Post-doctoral researcher, W.R. Grace & Co.-Conn., Research Department, Cambridge, MA, USA

Title: High aspect ratio particle sedimentation in aqueous vermiculite dispersions

Funding: W.R. Grace & Co.-Conn., Research

- Theoretical modeling of sedimentation of vermiculite dispersions in applications as thermal barrier coatings

1992:

Post-doctoral researcher, Tufts University, Medford, MA, USA.

Title: Production of Hydrogen Cyanide in a Solid Electrolyte Fuel Cell

Funding: National Science Foundation (NSF), DuPont Chemical Co., USA.

Publications in Refereed Journals

1) Fabrication of Thin Functional Films by Solution Aerosol Thermolysis (SAT)”,

A. Krestou, I. Giozis, G. Maroulis, A. Barbatsis, C. Tsanaktsidis, V. Kyriakou, and N. E. Kiratzis, ECS Journal of Solid State Science and Technology, (2018) 7 (11) P660-P670 DOI: 10.1149/2.0251811jss

2) Morphology and Structure of Ceramic Thin Films Deposited by Spray Pyrolysis

George Tsimekas, E. Papastergiades, and Nikolas E. Kiratzis

ECS Journal of Solid State Science and Technology, (2017) 6 (8) P553-P560 DOI: 10.1149/2.0301708jss

3) Applications of the technique of solution aerosol thermolysis (SAT) in solid oxide fuel cell (SOFC) component fabrication

N.E.Kiratzis

Ionics (2016) 22:751-770 DOI 10.1007/s11581-016-1704-3

4) Characterisation of polymer-based bio-composites

Tsouknidas, A., Kountouras, D., Maropoulos, S., Kiratzis, N., Michailidis, N.

Journal of the Balkan Tribological Association (2012) 18(4) 654-661

5) Preparation and characterization of copper based cermet anodes for use in solid oxide fuel cells at intermediate temperatures

N. E. Kiratzis & P. Connor & J. T. S. Irvine

J Electroceram (2010) 24(4), 270 – 287 DOI: 10.1007/s10832-009-9569-8

6) Fabrication of ceramic electrolytic films by the method of solution aerosol thermolysis (SAT) for solid oxide fuel cells (SOFC)

E. Papastergiades & S. Argyropoulos & N. Rigakis & N. E. Kiratzis

Ionics (2009) 15(5), 545 – 554 DOI: 10.1007/s11581-009-0313-9

7) Preparation and Characterisation of Copper/Yttria Titania Zirconia Cermets for Use as Possible Solid Oxide Fuel Cell Anodes

N.Kiratzis, P. Holtappels, C.E. Hatchwell, M. Mogensen, J.T.S. Irvine

Fuel Cells (2001) 1,211-18 DOI:10.1002/1615-6854(200112)1:3/4<211::AID-FUCE211>3.0.CO;2-H

8) Rheology and Microstructural transitions in the Lamellar Phase of a Cationic Surfactant

P. Partal, A.J. Kowalski, D. Machin, N.Kiratzis, M.G. Berni, and C.J. Lawrence

Langmuir (2001), 17 (5), 1331-37 DOI: 10.1021/1a0007731

9) The Rheology of Aqueous Alumina Suspensions in the Presence of Hydroxyethylcellulose as Binder

N.E.Kiratzis, P.F. Luckham

Journal of the European Ceramic Society (1999), 19 (15), 2605-12 DOI: 10.1016/S0955-2219(99)00049-7

10) Depletion flocculation of particulate systems induced by Hydroxyethylcellulose

N.E.Kiratzis, M. Faers, P.F. Luckham

Colloids and Surfaces A: Physicochemical and Engineering Aspects (1999), 151, 461-71 DOI: 10.1016/S0927-7757(98)00838-3

11) Rheological Behaviour of Stabilised Aqueous Alumina Dispersions in Presence of Hydroxyethyl Cellulose

N.Kiratzis, P.F. Luckham

Journal of the European Ceramic Society, (1998), 18(7), 783-90 DOI: 10.1016/S0955-2219(97)00117-9

12) Synthesis of HCN in a Solid-Electrolyte-Cell Reactor

E.A. McKenna, A. Othoneos, N.E.Kiratzis and M. Stoukides

Ind. Eng. Chem. Res., (1993), 32, 1904-13 DOI: 10.1021/ie00021a014

13) The Synthesis of HCN in a Solid Electrolyte Cell

N.Kiratzis, M. Stoukides

Journal of Catalysis, (1991), 132,257-62 DOI: 10.1016/0021-9517(91)90262-3

14)The Synthesis of Hydrogen Cyanide in a Solid Electrolyte Fuel Cell

N.Kiratzis, M. Stoukides

Journal of the Electrochemical Society, (1987), 134 (8), 1925-29 DOI: 10.1149/1.2100791

Publications in refereed conferences with full proceedings

1) Morphological Investigation of Thin Ceramic Films by Solution Aerosol Thermolysis (SAT)

A. Krestou, I. Giozis, G. Maroulis, A. Barbatsis, C. Tsanaktsidis, V. Kyriakou and N. E. Kiratzis

15th PanHellenic Symposium on Catalysis, 18-20 October, 2018, Ioannina, Greece

2) Fabrication and Characterization of thin Ceramic Films by Spray Pyrolysis

A. Krestou, I. Giozis, G. Maroulis, V. Kyriakou, C. Tsanaktsidis, and N. E. Kiratzis

Materials Today: Proceedings 5 (2018) 27636–27644, <http://www.materialstoday.com/proceedings>

3) Fabrication of Thin Electrode Films by Solution Aerosol Thermolysis (SAT)

A. Krestou, I. Giozis, G. Maroulis, V. Kyriakou, C. Tsanaktsidis, and N. E. Kiratzis

ECS Transactions, (2017) 78 (1) 1839-1850 DOI: 10.1149/07801.1839ecst ©The Electrochemical Society

4) Morphology and Structure of Solid Oxide Fuel Cell (SOFC) Components Fabricated by Spray Pyrolysis

G. Tsimekas, E. Papastergiades and N. E. Kiratzis

ECS Transactions, 78 (1) 1909-1922 (2017) DOI: 10.1149/07801.1909ecst ©The Electrochemical Society

5) Electrochemical Performance of SOFC Components Fabricated by Spray Pyrolysis Method

G. Tsimekas, E. Papastergiades and N.E. Kiratzis

ECS Transactions, 68 (1) 2479-2490 (2015) DOI: 10.1149/06801.2479ecst ©The Electrochemical Society

6) Insights into the Effects of Deposition Temperature on YSZ and CGO Thin Films Fabricated by Spray Pyrolysis

G. Tsimekas, E. Papastergiades and N.E. Kiratzis

ECS Transactions, 70 (1) 205-212 (2015) DOI: 10.1149/07001.0205ecst ©The Electrochemical Society

7) Electrocatalytic Behavior of Cu-based Ceramic-Metal (Cermet) Anodes in Contact with Yttria Stabilized Zirconia (YSZ) for Intermediate Temperature Solid Oxide Fuel Cells (SOFC)

K. Stamoulis, V. Mermiklis, S. Kostea, M. Trichakis, and N. E. Kiratzis

ECS Transactions, (2010) 25 (33), 193-201 DOI: 10.1149/1.3334808 © The Electrochemical Society

8) Analysis of suspended particulate levels in an industrial area of Greece over a multi-year period

A.G.Triantafyllou, N. Kiratzis, M. Voutsinas, H.S.Kiros, V.Evangelopoulos, and C.Vatalis

Proceedings of the 8th International Conference on Environmental Science and Technology, Lemnos Island, Greece, 8-10 September 2003, pg 798-805

9) Time dependent Critical Stress Phenomena in a double chain Cationic Surfactant System

M.G. Berni, N. Kiratzis, C.J. Lawrence and D. Machin

Proceedings International Congress on Rheology, 13th, Cambridge, UK (2000), British Society of Rheology, Glasgow, UK, 3, 285-87

10) Depletion Flocculation of Colloidal Systems in Presence of Hydroxyethylcellulose (HEC)

N.E.Kiratzis, M. Faers, P.F. Luckham

The 99 ChemShow Proceedings, (1999), International Exposition Company, New York, 531-39

11) Protons and electrons in CGO electrolytes

N.E.Kiratzis, B.C.H. Steele, J.M. Ralph, A. Atkinson, M. Sahibzada, J.A. Kilner

Electrochemical Society Proceedings, (1997), Volume 97-24, 36-43

12) Investigations on intermediate temperature (500-650°C) PEN structures incorporating Ce(Gd)O_{2-x} electrolytes

M. Sahibzada, B.C.H. Steele, K. Zheng, R.A. Rudkin, J.M. Bae, N. Kiratzis, D. Waller, I.S. Metcalfe

Proceedings of the 2nd European Solid Oxide Fuel Cell Forum, Ed. Bernt Thorsensen, (1996), 687-96

13) Properties and Applications of Ce(Gd)O_{2-x} Electrolytes in the Temperature Range 500-700°C

B.C.H. Steele, K. Zheng, R. Rudkin, N. Kiratzis and G.M Christie

Proceedings of the Fourth International Symposium on Solid Oxide Fuel Cells, Eds. M. Dockiya et al., (1995), 95-1, 1028-38

14) Preliminary Investigations on Direct Methanol Ceramic Fuel Cell for Electric Vehicles

B.C.H. Steele, K. Zheng, N. Kiratzis, R. Rudkin and G.M. Christie

1994 Fuel Cell Seminar, 479-82

15) Modelling of the Synthesis of Hydrogen Cyanide in an Yttria-Stabilised Zirconia Cell

M. Stoukides, A. Othoneos and N.Kiratzis

Proceedings of the Second International Symposium on Solid Oxide Fuel Cells, (1991), 369-76

Other conferences contributions (2004-2017): 22

Student undergraduate degree theses supervised (2004-2017): 5

Committee member in PhD dissertation examinations: 2

Professional Memberships

Electrochemical Society (ECS) USA (member)

American Institute of Chemical Engineers (AIChE) USA (senior member)

Technical Chamber of Greece (member)