CURRICULUM VITAE

Professor George P. Androutsopoulos

Dr G. Androutsopoulos received an MSc and a PhD in Chemical Engineering from the University of Manchester (former UMIST), U.K. in 1974 and 1977 respectively. He obtained his Diploma in Chemistry from the University of Athens, Greece, in 1969. He joined the School of Chemical Engineering of the National Technical University of Athens (NTUA) in 1977 as an Instructor in the Chemical Process Engineering Laboratory. He subsequently followed a promotion course from the Lecturer grade through to his present status of Professor in Chemical Reaction Engineering and Reactor Design. His research work focus is on Solid Fuels Gasification-Gas Upgrading-Utilization as well as on Porous Materials Characterization as relates to Heterogeneous Catalytic Processes and Porous Membrane applications involving reactions accompanied by permselective gas separation.

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Research Interests

The focus of Dr Androutsopoulos' **research interests** fall in the following areas: (1) Solid Fuels Conversion Clean Technologies (i.e. coal-biomass-wastes gasification-pyrolysis processes), gas purification, upgrading and utilization for electric power generation via the IGCC or Fuel Cell technologies and (2) The advancement of porous materials characterization methods and the related applications in heterogeneous catalysis (electrocatalysis included), porous membrane combined reaction-separation processes.

Administration Work Contribution

Dr Androutsopoulos participated in the University Committee for Undergraduate Studies as representative of the School of Chemical Engineering for the period (1995-2005). Under this capacity acted as Project Director and member of the main research group of the following projects:

(1) Upgrading of the Undergraduate Curriculum of the three Chemical Engineering Departments of Greece.

(2) Upgrading of the Computational Component of the Chemical Engineering Curriculum, School of Chemical Engineering of NTUA.

Teaching Experience

Dr G. Androutsopoulos, as a member of staff of the School of Chemical Engineering (NTUA) teaches for more than 25 years undergraduate courses on Chemical Reaction Engineering, Reactor Design, Chemical Reaction Engineering Laboratory (practical training) and Introduction to Chemical Engineering (Mass and Energy Balances). He introduced and taught the Introduction to Chemical Engineering course in the Department of Chemical Engineering of the University of Patras, 1978-1982.

Development of Research Infrastructure

Dr G. Androutsopoulos has developed coal-biomass gasification facilities, being a branch of the overall facilities of the Chemical Process Engineering Laboratory (CPEL). Main equipment are as follows:

(1) **A pilot solids fuel gasification plant** that includes an allothermal (indirectly heated using electrical resistances) rotary kiln reactor, bearing internally various types of lifting flights. Reactor operation is control via a PID controller interfaced with a P/C computer for on line monitoring and recording of plant operating data. A gas product handling, cooling and cleaning plant is installed downstream the gasifier. Solid feed crushing and sieving pilot size equipment support the implementation of pilot plant gasification experiments.

(2) **Two indirect heat gasification reactors of laboratory size** as follows:

(i) A horizontal electrically heated gasifier equipped with a flighted co-axial agitator. The gas product section is designed appropriately to enable tar condensation and separation prior to gas scrubbing in water.

(ii) An allothermal fluidized bed gasification reactor that can be connected to the gas treating unit of reactor (i).

The pilot and laboratory gasification reactors are connected with a GC Apparatus enabling the on line gas analysis.

(3) **A thermobalance connected to Mass Spectrometer** (TGA-MS) is available for solid fuels pyrolysis and gas product analysis (especially tar characterization).

(4) **Auxiliary Solid fuels Analysis and characterization,** e.g furnaces for fuels proximate analysis (i.e. moisture, volatile matter ash determination), analytical balance, soxhlet extraction apparatus (i.e. tar cleaning) etc.

(5) **There are available a set of mechanical tools** (e.g. for metal cutting, drilling, smoothing, and welding) needed for small scale metallic constructions, equipment modification and service.

Research Experience

Thermochemical Coal Biomass Conversion

Industrial research experience was obtained from his participation as **Project Director** of the **'Greek Lignite Gasification Project'** funded jointly by the PPC (Public Power Generation of Greece) and the GSR&T (General Secretary for Research and Technology, Greece), Science for Stability Program (Total expenditure: 3.0 million USA $). The work involved the design, construction and operation of big gasification installation (plant capacity: 2.5 tn natural lignite/day) for the 'allothermal' (indirect heat) gasification of Greek Lignite containing its full natural moisture to produce medium heating value dry gas of ~ 12 MJ/Nm^3. It was carried out in PPC premises in the years 1984-1993. Representative results are reported in ref.: G.P., Androutsopoulos, et al., Chem. Eng. Commun., 190 (2003), 1200-1232'.

Further research experience was acquired from his participation as **Project Director** in the following projects:

1. ‘***Upgrading of High Moisture Low Rank Coal to Hydrogen and Methane (A Sustainable Process with Integrated CO_2 Removal and Ash Utilization)’ C2H Project.*** European Commission. Research Directorate General. Research Program of the Research Fund for Coal and Steel**.** Project Director, (participation as partner). Work completed in 2007. Fund allocated to our Laboratory 350 000 EURO. A summary of results were presented in ref. G. Androutsopoulos, et al Production of Hydrogen Enriched Synthesis Gas via the Gasification of Solid Fuels/Lime Mixtures. 15th European Biomass Conference and Exhibition, Germany Berlin May7/11, 2007.

2. ‘Investigation of design parameters of allothermal gasification process and H_2S separation from the gasification product’. Project was funded by GSR&T/EPET II/PENED 99 and completed in 1999.

The gasification pilot installation housed in the Semi-industrial Lab of the School of Chemical Engineering (NTUA), was employed to carried out the work of the above two projects. A description of this plant is reported in ref.: C. S. Hatzilyberis, G.P. Androutsopulos, Lignite Chemical Conversion in an Indirect Heat Rotary Kiln Gasifier, Thermal Science, 2006, 10, (3) 181-197.

3. *‘Materials for Gas Sensors Applications’*, *Project Director Ch. Tsamis, of* the Institute of Electronics, National Research Center of Physical Sciences (‘Demokritus’), Project was funded by GSR&T/EPET II/PENED 95 and completed in 2003. (participation status partner, Project Director Dr G.P. Androutsopoulos).

Relevant publication: C. Tsamis, et al. L., Hydrogen Catalytic Oxidation Reaction on Pd-doped Porous Silicon, IEEE Sensors Journal, 2002, 2, No2, 89-95.

Porous Materials Characterization - Heterogeneous Catalysis and Membrane Separations Applications

Oil Desulphurization Heterogeneous Catalytic Process Studies

Dr G.P. Androutsopoulos participated also as Project Director or Researcher in the research projects, mentioned below, concerning the Hydrodesulphurization (HDS) of Atmospheric Oil Residue from Thassos Crude (Greek crude oil) and implemented in the Chemical Process Engineering Laboratory, of the School of Chemical Engineering (NTUA).

1. ‘Improving the Hydrodesulphurization Method of Thassos Oil Distillation Residue’ (Extension): (Project GSR&T/PAET:11968 (EPE) 1349/30.11.84) Project Director Dr G. Androutsopoulos.

2. ‘Improving the Hydrodesulphurization Method of Thassos Oil Distillation Residue’: (Project GSR&T/YEET No 81011/25.5.81, Project Director Dr J. Marangosis (GPA researcher).

3. ‘Desulphurization of High Sulfur Content Greek Oil’. A Technical and Economic Plant Design Study for the Hydrodesulphurization of Atmospheric Residue of Thassos Crude. Plant capacity: 12 500 bbl/day. Work sponsored by the Technical Chamber of Greece. Research group: Dr G. Androutsopoulos and Dr A. Scamagas). Final report, 42 pages, August 1978.

Related publications: J.M. Ammus, G.P. Androutsopoulos**,** Ind. Eng. Chem. Res., 1987, **26**, 494-501. And J.M. Ammus, et al. Ind. Eng. Chem. Res., 1987**, 26**, 1312-1323.

Selected Publications

Coal Gasification, Utilization and Related Technologies

G.P. Androutsopoulos, K.S. Hatzilyberis, N.A. Theofilou, D.S. Agallianos, .G. Chronis, V.N. Kapassakalis, A.G. Karsakos, A.N. Katsaros, C.P. Stamatakis, C.L. Zissis, Gasification of Greek Lignite in an Indirect Heat (Allothermal) Rotary Kiln Gasifier, Chem. Eng. Commun., 2003, 190, 1-33.

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C. Tsamis, L. Tsoura, A. Travlos, A.G. Nassiopoulou, C.E. Salmas, K.S. Hatzilyberis and G.P. Androutsopoulos, Hydrogen Catalytic Oxidation Reaction on Pd-doped Porous Silicon, IEEE Sensors Journal, 2002, 2, No2, 89-95.

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K.S. Hatzilyberis, G.P. Androutsopoulos, C.E. Salmas, Indirect Thermal Drying of Lignite: Design Aspects of a Rotary Dryer, Drying Technology, 2000, 18(9), 2009-2049

K.S. Hatzilyberis, G.P. Androutsopoulos An RTD Study for the Flow of Lignite Particles Through a Pilot Rotary Dryer. Part I: Bare Drum Case, Drying Technology, 1999, 17 (4&5), 745-757.

K.S. Hatzilyberis, G.P. Androutsopoulos, An RTD Study for the Flow of Lignite Particles Through a Pilot Rotary Dryer. Part II: Flighted Drum Case, Drying Technology, 1999, 17 (4&5), 759–774.

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Porous Materials Characterization - Heterogeneous Catalysis and Membrane Separations Applications

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J. Marangozis, P. Mavros and G. Androutsopoulos, Selectivity of Catalytic Hydrogenation of Cottonseed Oil in Slurry Reactors, 1st Mediterranean Congress on Chemical Engineering, Barcelona, Spain, Nov. 21-24,**1978**.

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Seminars–Workshop

1. ***Workshop on the Characterization of Porous Solids (Kursgard Brostorp SWEDEN, June 7-10, 2001)***
   Dr G. Androutsopoulos, participated in the Workshop on *Characterization of Porous Solids*, organized by Dr K. Unger, Professor at Mines University, Germany and held in Kursgard Brostorp SWEDEN, June 7-10, 2001. A group of experts participated and gave there own seminars (three lectures of one hour long each). The subject of Dr G. Androutsopoulos' seminar had the title**:** ***CPSM, the Random Corrugated Pore Structure Model (A Unified Theory: Simulation of Nitrogen Sorption and Mercury Porosimetry Hysteresis Phenomena. Prediction of Tortuosity Factors).***

2 ***Lecture presentation in Department of Chemical Engineering of the California Institute of Technology, CA, USA***
   G. Androutsopoulos, visited the Department of Chemical Engineering of the California Institute of Technology having a leave of absence from NTUA (Sept.-Nov. 2001) and had a research cooperation with Prof. G. Gavalas. During his stay had the opportunity to present a seminar reporting his research results on porous materials characterization under the title***: CPSM: "The Random Corrugated Pore Structure Model".***

3 Workshops of Participating Partners of the Research Project: C2H Project: Upgrading of High Moisture Low Rank Coal to Hydrogen and Methane.

Workshops for the reporting of research results obtained by the partners research groups over the pertinent work period:

1. Stuttgart, Germany, University of Stuttgart, May 2004
2. Corelane, Northern Ireland, University of Corelane, December 2004.
3. Athens School of Chemical Engineering, NTUA, 3-5 February 2005
4. Cottbus, Germany, Vatterfall Company in Cottbus, 25-28 July 2005
5. Oviedo, Spain, University of Oviedo, 20-21 February 2006
6. Wroclaw, Poland, University of Wroclaw, 13-15 December 2006