

# **CURRICULUM VITAE**

**Dr. Christos Tsakiroglou**

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## **PERSONAL**

Name : Christos Tsakiroglou  
Position : Research Director  
Office address : Foundation for Research and Technology Hellas-Institute of Chemical Engineering Sciences (FORTH/ICE-HT)  
Stadiou street, Platani, P.O.Box 1414, GR-26504 Patras, Greece  
(Tel. 30 261 965212, Fax: 30 261 965223)  
Home address : 81 Athinon, GR-26441 Patras, Greece (Tel. 30 261 430511)  
Marital status : Married, two children  
Citizenship : Greek  
e-mail : [ctsakir@iceht.forth.gr](mailto:ctsakir@iceht.forth.gr)

## **ACADEMIC STUDIES**

9/79 - 5/85 : Undergraduate Student, Department of Chemical Engineering, Aristotle University of Thessaloniki, Greece  
1/84 - 5/85 : Ing.Dipl.Thesis  
Department of Chemical Engineering, Aristotle University of Thessaloniki  
Title: *"Theoretical Study of the Control of Chemical Reactors for Various Systems of Exothermic Reactions"*  
5/85 : Dipl.Ing. Chemical Engineering  
9/85 - 9/90 : Graduate Student, Department of Chemical Engineering, University of Patras, Greece  
9/85 - 9/90 : Ph.D.Thesis  
Department of Chemical Engineering, University of Patras  
Title: *"Improved Method of Analysis of the Pore Structure of Permeable Solids: Application to Greek Oil-Bearing Rocks"* (advisor: Prof. A.C. Payatakes)  
11/90 : Ph.D. Chemical Engineering

## **POSITIONS**

9/85 - 9/90 : Research Assistant  
Institute of Chemical Engineering & High Temperature Chemical Processes (FORTH/ICE-HT)  
1/91 - 1/92 : Fulfillment of Military Services (mandatory) in Greek Army  
6/92 - 9/92 : Researcher/Engineer, Enterprise for the Support of the Research Technology and Education  
5/94 - 5/95 : Post-Doctoral Research Fellow  
Institut Francais du Petrole (IFP), France  
9/95 - 9/98 : Research Associate, FORTH/ICE-HT  
9/98 - 9/04 : Associate Researcher (Rank C), FORTH/ICE-HT  
9/04 - 9/13 : Principal Researcher (Rank B), FORTH/ICE-HT  
10/13- : Research Director (Rank A), FORTH/ICE-HT

## **FOREIGN LANGUAGES**

English: Very good knowledge

French: Good knowledge

## **PROFFESIONAL AFFILIATIONS**

2012 Hellenic Institute of Hydrocarbons (HELLINHY)  
2009-today International Society for Porous Media (InterPore)  
2003-today Society of Core Analysts (SCA)  
1999-today Society of Petroleum Engineers (SPE)  
1986-today Technical Chamber of Greece.

## **REVIEWER FOR SCIENTIFIC JOURNALS**

*Physical Review Letters, Physical Review E, Physics of Fluids, Environmental Science and Technology, Industrial and Engineering Chemistry Research, Transport in Porous Media, Advances in Water Resources, FUEL, International Journal of Multiphase Flow, Chemical Engineering Science, Water Resources Research, AIChE J., J. Hydrology, J. Contaminant Hydrology, Geoderma, J. Environmental Management, Soil and Sediment Contamination: An International Journal, J. Microporous Mesoporous Materials, Materials Research Bulletin, Chemosphere, J. Hazardous Materials, J. Hydroinformatics, Rheologica Acta, Asia-Pacific Journal of Chemical Engineering, Critical Reviews in Environmental Science and Technology, Canadian Journal of Chemical Engineering*

## **EVALUATOR FOR RESEARCH PROPOSALS**

European Commission (7<sup>th</sup> FP, H2020, Horizon Europe), Israel, Czech Republic, UEFISCDI-Romania, Qatar Foundation, IKY Scholarships/Greece

## **PUBLICATION RECORD**

Scientific articles in peer-reviewed journals (ISI): **92** (*h index=28; CI~2200; corresponding author in 64/92*)

Invited chapters in international books: **5**

Papers in peer-reviewed international conference proceedings: **72**

Papers in non-refereed international conference proceedings: **18**

Papers in national conference proceedings: **32**

Presentations in conferences: **129**

## **TEACHING & TRAINING ACTIVITIES**

1985-1990 **Teaching Assistant**, Department of Chemical Engineering, University of Patras, Assistant Instructor of courses: (1) *Fluid Mechanics*; (2) *Unit Operations I (pumps/distillation/absorption)*; (3) *Unit Operations II (heat exchangers)*

2005-2009 **Adjunct Professor**, Department of Mechanical Engineering, Higher Technological Educational Institute of Patras, Instructor of Courses: (1) *Fluid Mechanics I (8 semesters)*; (2) *Fluid Mechanics II (4 semesters)*.

2014-2019 **Adjunct Professor**, Hellenic Open University, School of Science and Technology, Postgraduate program: "Waste Management"

Advisement of Ph.D. students

- 1 Sygouni Varvara (4/2002-1/2007, Department of Chemical Engineering, University of Patras). Thesis title: “A new method for the measurement of the fractional wettability of porous media from two-phase displacement experiments”.
- 2 Aggelopoulos Christos (9/2004-7/2007, Department of Physics, University of Patras). Thesis title: “Development of laboratory methods to determine the effective transport coefficients of soils from dynamic experiments”
- 3 Tzovolou Dimitra (11/2006-7/2011, Department of Chemistry, University of Patras). Thesis title: “Comparative analysis of methods used for the remediation of the unsaturated zone of a soil polluted by kerosene”
- 4 Terzi Katerina (2/2014-5/2017, Department of Chemical Engineering, University of Patras). Title of Thesis: “Experimental study of the nanofluid-based remediation of porous media polluted by chlorinated hydrocarbons”
- 5 Karavasilis Michalis (11/2018- , Department of Chemistry, University of Patras). Title of Thesis: “Development of advanced hybrid systems for the purification of water”
- 6 Stavrinou Anastasia (12/2019-..., Department of Physics, University of Patras). Title of Thesis: “Low-cost hybrid sorbents for the removal of mixtures of pollutants from water matrices”
- 7 Christodoulis Constantinos (4/2021-....., Department of Physics, University of Patras). Title of Thesis: Experimental study of the advanced oxidation of organic pollutants in soils by ozonation”.
- 8 Melitsiotis Anastasios (12/2021-....., Department of Physics, University of Patras). Title of Thesis: Transport of Per- and Polyfluoroalkyl Substances (PFAS) in the subsurface, and design of a prototype for their removal from drinking water”.

#### Advisement of M.S. students

1. Aggelopoulos Christos (9/2002-7/2004, Department of Physics, University of Patras). Title of Thesis: “Measurement of the resistivity and reactivity index of porous materials”
2. Magga Zoi (1/2007-7/2008, Department of Chemistry, University of Patras). Title of Thesis: “Assessment of the fate of pesticides in groundwater from flow experiments in soil columns ”
3. Katerina Terzi, (9/2011-1/2014), Department of Chemical Engineering, University of Patras). Title of Thesis: “Study of the effects of CO2 leakages from storage sites on groundwater quality and soil properties”
4. Alexandra Sikinioti-Lock (9/2014-9/2015), Department of Chemical Engineering, University of Patras). Title of Thesis: “Numerical modeling of the NAPL source zone remediation by zero-valent iron nanoparticles”
5. Theodoridou, E (9/2014-5/2015, MSc program: Waste Management, Hellenic Open University). Title of Thesis: “Spatial Planning, Urban Planning and Land Use for Environmental Management using Geographical Information Systems Spatial Planning, Urban Planning and Land Use for Environmental Management using Geographical Information Systems (GIS)”
6. Georgiou, K (9/2015-7/2016, MSc program: Waste Management, Hellenic Open University). Title of Thesis: “Current trends in recycling waste excavation, demolition and construction: international experience and prospects for the Greek site”.
7. Karkania, B (9/2015-7/2016, MSc program: Waste Management, Hellenic Open University). Title of Thesis: “Exploring the use of new technologies to optimize effluent quality and reduce the operating cost of the Farsala Municipality wastewater treatment plant”.
8. Myronidis, G. (9/2016-7/2017, MSc program: Waste Management, Hellenic Open University). Title of Thesis: “Irrigation of crops using treated municipal wastewater ”
9. Kipourou, E. (9/2016-7/2017, MSc program: Waste Management, Hellenic Open University). Title of Thesis: “Waste management and valorization technologies for energy recovery in the cement industry: Applications in TITAN SA ”

10. Athanasiou, M.E. (9/2016-7/2017, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "Processing and reuse of slaughterhouse waste: study of the problem in the Regional Unity of Karditsa"
11. Michalopoulou, V. (9/2016-5/2017, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "Management of Municipal Solid Wastes. Case study in Aliveri of the Regional Unit of Evia: Current Status and Alternative Scenarios of Waste Management"
12. Moraitaki, K. (11/2017-7/2018, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "Planning of an integrated system of green points in the municipality of Tripoli"
13. Soultani, E. (11/2017-7/2018, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "In situ remediation of groundwater by injecting zero valent nano-iron: assessment of field-scale experiments and perspectives"
14. Tsigounakis, Ch. (11/2017-7/2018, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "Combustion of biogas for energy cogeneration from urban waste water treatment: the case of the Municipal Water Supply and Sewerage Company of Heraklion"
15. Karavasilis, M. (9/2017-11/2018, MSc program, Department of Material Science, University of Patras). Title of Thesis: "Synthesis and characterization of zero valent nanoparticles (nZVI) from plant extracts"
16. Voutsis, E (10/2018-5/2019, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "Electronic wastes and their toxicity in longshore environment"
17. Kotsiaris, N (11/2018-7/2019, MSc program: Waste Management, Hellenic Open University) Title of Thesis: "Resetting the positioning of waste and recycle bins: case study for Trikala city"
18. Tziora, B (11/2018-7/2019, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "Decision making system for the positioning of landfills inside woodlands: case study for the landfill «Hellinikon» in the regional unity of Ioannina"
19. Stavrinou, A. (7/2018-10/2019, MSc, Department of Physics, University of Patras). Title of Thesis: "Valorization of agricultural waste biomass to develop adsorbents for water purification"
20. Goudanis, G. (11/2019-7/2020, MSc program: Waste Management, Hellenic Open University). Title of Thesis: "Valorization of wastes generated during the harvesting and treatment of olives, for the production of ether oils and pharmaceutical and aromatic substances: case study of Peloponnese region"
21. Ntente, Ch. (1/2021- , MSc program: Chemistry and Material Technology with Applications to Industry, Energy and Environment, Department of Chemistry, University of Patras) Title of Thesis: "Assessment of polymer- and nanoparticle-based fluids as agents for enhanced oil recovery".

Supervision of undergraduate students employed in FORTH/ICE-HT

1. Sygouni V. (7/2000-3/2002, Dpt. Chem. Eng, Univ. of Patras)
2. Spyropoulos F. (7/2000-9/2001, Dpt. Chem Eng., Univ. of Patras)
3. Petsi A. (4/2000-9/2001, Dpt. Chem. Eng., Univ. of Patras)
4. Aggelopoulos C. (7/2001-6/2002, Dpt. Physics, Univ. of Patras)
5. Kabouri M. (7/2001-1/2002, Dpt. Pharmacy, Univ. of Patras)
6. Bjorni Hasa (7/2011-9/2011, practical exercise, Dpt Physics, U. Patras)
7. Bazin Morgane (29/6/2011-29/9/2011, practical exercise, ENSIACET, Toulouse, France)
8. Niarchos Dimitris (1/5/2015-31/5/2015, practical exercise, Dpt Environmental Engineering, Technical University of Crete)
9. Karahaliou Vassiliki (1/4/2015-30/6/2015, practical exercise, Dpt. Physics, U. Patras)
10. Stavrinou Anastasia (1/4/2016-30/6/2016, practical exercise, Dpt. Physics, U. Patras)
11. Meropoulis Stavros (1/4/2017-30/6/2017, practical exercise, Dpt. Physics, U. Patras)
12. Aggelou, A. (1/7/2018-30/9/2018, practical exercise, Dpt. Physics, U. Patras)

13. Savva, S. (1/4/2019-30/6/2019, practical exercise, Dpt. Physics, U. Patras)
14. Ntente, Ch. (1/7/2019-30/9/2019, practical exercise, Dpt. Chemistry, U. Patras)
15. Rompolas-Karavelis, A. (1/7/2020-30/9/2020, practical exercise, Dpt. Physics, U. Patras)
16. Nikolakopoulou, D. (1/10/2020-31/10/2020 & 1/5/2021-30/6/2021, practical exercise, Dpt. Physics, U. Patras)
17. Strekla, A. (1/4/2-21-30/6/2021, practical exercise, Dpt. Physics, U. Patras)

Supervision of scientific personnel employed in FORTH/ICE-HT

1. Karoutsos V. (6/2000-4/2003, Ph.D., Physics)
2. Karahaliou C. (4/1999-9/2001, B.S., Chemistry)
3. Papanicolaou D. (7/2001-7/2002, Dipl. Ing., Chem. Eng.)
4. Tzovolou D. (8/2001-1/2002, 6/2005-1/2007, M.Sc., Chemistry)
5. Loi Ch. (12/2006-10/2007, B.S., Biology)
6. Magga Z. (9/2005-1/2007, B.Sc., Chemistry)
7. Hajdu K. (7/2014-7/2015, Ph.D. Biophysics)
8. Terzi K. (3/2019-8/2019, Ph.D. Chemical Engineering)
9. Iatridi Z. (3/2020-1/2021, Ph.D. Chemistry)
10. Theodoropoulou M. (3/2020-11/2021, Ph.D. Physics)
11. K. Bali (6/2020-2/2021, Ph.D. Chemical Engineering)

Supervision of > 20 Dipl. Theses of undergraduate students of Univ. Patras

Participation in the examination committee of Ph.D. students

1. Eleni Arvaniti, Dpt. Chemical Engineering, U. Patras (2009).
2. Vasilis Michalis, Dpt. Chemical Engineering, U. Patras (2011).
3. Nadia Bali, Dpt. Chemical Engineering, U. Patras (2019).

**AREAS OF SCIENTIFIC AND TECHNOLOGICAL INTEREST**

- Multiphase flow and transport phenomena in porous media
- Enhanced oil recovery (EOR) methods in conventional and unconventional reservoirs
- Characterization of the pore structure of materials
- Measurement and numerical calculation of the single- and multi-phase effective transport coefficients of porous materials
- Measurement of the rheological properties of fluids and flow of non-Newtonian fluids in porous media
- Physicochemical methods of wastewater treatment
- Risk assessment and remediation of contaminated soils and aquifers
- CO<sub>2</sub> storage in underground reservoirs and environmental impacts
- Wastewater and contaminated soil remediation by advanced oxidation processes
- Risk assessment and design of remediation strategies for contaminated lands

**EXPERIMENTAL TECHNIQUES**

- Mercury porosimetry
- Core analysis & special core analysis for rocks and soils
- Rheological characterization of non-Newtonian fluids
- Measurement of capillary, and electrical properties of porous media
- Visualization of multiphase transport and reactive processes in model porous media
- Measurement of effective flow and transport coefficients in porous media
- Image analysis

- Chemical characterization of soils and waters (UV-Vis, GC-MS, GC-FID, GC-ECD)

## **THEORETICAL METHODS**

- Computational fluid dynamics and numerical simulation of transport and reactive processes in porous media
- Theoretical methods of statistical physics of disordered media (Monte Carlo processes, Percolation theory, effective medium approximation, fractal geometry)
- Determination of the microstructural parameters of porous materials by the combination of experimental methods with theoretical simulation
- Up-scaling the macroscopic effective flow coefficients of heterogeneous porous media with multi-scale network analysis
- Numerical methods and computational algorithms for the estimation of the parameters of non-linear models with inverse modeling of experimental datasets

## **RESEARCH ACTIVITIES**

### **1. Characterization of the pore structure of materials.**

Estimation of the geometrical and topological properties of meso- (e.g. catalyst carriers) and macro- (e.g. soils, rocks) porous materials by combining percolation models with datasets of various experimental techniques (e.g. Hg porosimetry, N<sub>2</sub> sorption, SEM image analysis). Application to single-porosity and double-porosity (heterogeneous) materials. Use of the critical path analysis of percolation theory for the calculation of the transport (hydraulic & electrical conductivity) properties of heterogeneous porous materials from pore structure parameters. Modeling of the fracture aperture and calculation of the effective transport coefficients of single fractures

### **2. Two-phase flow in porous media.**

(a) *Fundamental studies.* Visualization studies of two-phase flow in glass-etched pore networks. Development of non-Darcy flow models, and correlation of the two-phase flow pattern & effective coefficients (e.g. relative permeability & capillary pressure curves) with capillary number, shear thinning fluid rheology, and pore network properties. Comparative analysis of two-phase flow coefficients measured with steady-state and unsteady-state methods.

(b) *Soil column tests.* Transient immiscible displacement experiments in disturbed / undisturbed soils. Estimation of the relative permeability functions / capillary pressure curve of soils with inverse modelling. Development of multi-scale & network-type numerical models to simulate the immiscible displacement of oil/water and calculate the up-scaled two-phase flow coefficients for highly heterogeneous soils. Dependence of the steady-state oil/water & gas/water relative permeabilities on capillary number.

### **3. Hydrodynamic dispersion in porous media.**

(a) *Fundamental studies.* Development of a visualization technique for the study of miscible displacement in porous media and correlation of solute dispersion pattern & longitudinal / transverse dispersion coefficients with pore space morphology and flow conditions

(b) *Soil column tests.* Development of experimental setups and macroscopic numerical models for the study of miscible displacement in disturbed and undisturbed soils and correlation of the hydrodynamic coefficients with multi-scale soil heterogeneities and flow conditions.

### **4. Soil and groundwater contamination and remediation.**



(a) **Risk assessment of contaminated soil and groundwater.** Soil column experiments and macroscopic simulation of the fate of organic pollutants in the subsurface (e.g. advection/dispersion/ sorption/ biodegradation of pollutants in groundwater). Chemical characterization of contaminated soils and groundwater with chromatographic techniques (GC-MS, GC-FID, Ion-chromatography).

(b) **Soil remediation technologies.** Design, lab-scale / pilot-scale testing, and numerical modelling of soil and groundwater remediation technologies. Development and testing of innovative oxidation technologies (e.g. non-thermal plasma discharge, ozonation) for the remediation of soils contaminated by persistent and recalcitrant pollutants.

5. **Carbon dioxide storage in saline aquifers.**

Experimental investigation and numerical modeling of CO<sub>2</sub> dissolution in aquifers, and correlation of the dissolution rate with the heterogeneity of porous media. Effects of CO<sub>2</sub> leakages from deep storage sites on shallow freshwater aquifers: experimental study and numerical modeling of the dynamic physico-chemical interactions of soil/groundwater/CO<sub>2</sub> (e.g. CO<sub>2</sub> dissolution, heavy metal immobilization, etc) during the simultaneous two-phase flow of water/CO<sub>2</sub> through a soil column.

6. **Nanoparticle-based enhanced oil recovery**

Optimization of the interfacial/wetting properties of polymer-coated nanoparticles (PNPs) toward the mobilization of trapped oil ganglia from porous media. Preparation and characterization of PNP-based Pickering emulsions, and foams, and testing them as chemical flooding agents in porous media models (glass-etched pore networks & sandpacks) and core plugs. Correlation of the oil recovery efficiency with PNP properties.

7. **In situ groundwater remediation by nanoparticles**

Synthesis of stable zero valent iron nano-colloids from plant extracts (e.g. tea leaves, pomegranate). Quantification of the capacity of nanoparticles to remove organic (chlorinated hydrocarbons) and inorganic (Cr<sup>VI</sup>) as bulk phase, dissolved in water and adsorbed on porous media. Determination of kinetic parameters controlling soil / groundwater / pollutant / nanoparticle interactions. Development of true-to-the mechanism multi-scale numerical models.

8. **Biomass valorization**

Development of cost-effective adsorbents with chemical activation and thermal treatment of agricultural wastes. Advances toward the development of low cost hybrid adsorbents capable to remove "cocktails" of multi-species pollutants (e.g. dyes, heavy metals, nitrates, PFAS) from wastewater.

## **PARTICIPATION IN RESEARCH PROJECTS**

1987 - 1990

**Participation** in EC-funded cooperation research project (1987-1991) between FORTH/ICE-HT and Public Petroleum Corporation of Greece (DEP) with title: «Improved method of measurement and characterization of the porous microstructure of oil reservoir rocks; Application to cores samples from Greek reservoirs»

1988 - 1990

**Participation** in cooperation research project between FORTH/ICE-HT (Greece), IFP (France), HALDOR TOPSOE A/S (Denmark), DGU (Denmark) and Technical University of Denmark with title: "*Development of a general computer-aided technique for the characterization of the microscope structure of industrial porous media and development of general network*"

*simulators for the prediction of multiphase flow and transport phenomena in such structures" under the programme CEC-BRITE, 1988-1992.*

5/94 - 5/95

**Participation** in research project with title: *"Determination and modeling of the electrical properties of porous media of intermediate wettability"* at **Institut Francais du Petrole (IFP), 1994-1995.**

9/95 – 1/98

**Participation** in cooperation research project between FORTH/ICE-HT, TITAN (Cement Industry, Camari-Viotia), EKEFE "DEMOCRITOS" (Nuclear Center, Athens), Institute of Electronic Structure and Laser-Foundation for Research and Technology (Research Institute, Crete), Technology of Environmental Protection (Private Company, Marathon-Attiki) και ECON Optics Mechanics (Private Company) with title: *"Clear combustion of organic wastes in rotary kilns of cement industry and development of a new technology for the measurement of environmental parameters"* under the **Operational Programme for Research and Technology of the Greek Ministry of Industry Energy and Technology (EPET II), 1995-1998.**

1/96 – 1/98

**Participation** in cooperation research project (1996-1999) between FORTH/ICE-HT, University of Limoges (FR), Technical University of Clausthal (DE), Fraunhofer Institute for Biomedical Engineering (DE), University of Wales Swansea (GB), OLDHAM FRANCE S.A. (FR), CITY TECHNOLOGY LTD (GB) with title: *"Surface modification and optimization of gas nanoelectroceramics-based sensor systems"*, under the programme **EU-BRITE/EURAM, 1995-1999.**

11/97-11/00

**Participation** in cooperation research project (1997-2000) between FORTH/ICE-HT (Coordinator), University of Stuttgart (Germany), IMBB-FORTH (Crete-Greece), Delft University of Technology (Netherlands) και Geological Survey of Denmark and Greenland (Denmark) with title: *"Pore -to-core scale-up studies of the transport properties of organic pollutants with natural attenuation"* under the programme **ENVIRONMENT AND CLIMATE, 1997-2000.**

4/1999-1/2000

**Scientific responsible** of a "Guest Experiment" titled *"Fabrication of microcells and pore networks for the investigation of multiphase transport processes in porous media"* and performed at the Institute of Microtechnology Mainz (IMM) – Germany, under the TMR-LSF Project of IMM: *"Microfabrication for Users"* **(1998-2000).**

1/12/99-31/11/01

**Scientific responsible** of industrially-funded research project between FORTH/ICE-HT and HALDOR TOPSOE A/S (Manufacturer of Catalysts – Denmark) with title : *"A novel method of characterization of the pore structure of catalyst carriers"*.

1/2/00-31/1/03

**Coordinator and scientific responsible** of cooperation research project (2000-2003) between FORTH/ICE-HT (Coordinator), Institut Francais du Petrole (France), Geological Survey of Denmark and Greenland (Denmark) and CH2M-Hill (Spain) with title: *"Toward an Improved Risk Assessment of the Contaminant Spreading in Fractured Underground Reservoirs – TRACE-FRACTURE"* under the programme **ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT (1998-2002).**

27/3/03-26/3/04

**Scientific responsible** of bilateral cooperation project between FORTH/ICE-HT and Institut Francais du Petrole with title : “*Characterization of the pore structure and determination of the transport coefficients of reservoir rocks*” under the Programme **PLATON – Bilateral cooperation Greece France (2002-2004)**.

1/6/04-30/11/07

**Scientific responsible** of Specific Targeted Research Project / STREP (2004-2007) between FORTH/ICE-HT, IFP (France), Geological Survey of Denmark and Greenland (Denmark), Broeker A/S (Denmark) and Hydrogeotechnika (Poland) with title: “*In situ STimulation and REmediation of contaminated fractured SOILs – STRESSOIL” under the programme **GLOBAL CHANGE AND ECOSYSTEMS (2003-20007)***

1/9/04-31/8/08

**Participation** in Network of Excellence (NoE) with partners: CNRS (Coordinator, FR), FORTH/ICE-HT, ASIES (FR), Imperial College (UK), IBET (P), GKSS (D), Vito (BE), SINTEF (NO), Utwente (NL), UNIZAR (SP), LUT (FI), ITM-CNR (IT), ICTP (CZ), and title: “*Expanding membrane macroscale application by exploring nanoscale material properties – NanoMemPro*”.

1/1/2005-31/12/2007

**Principal investigator** in research project co-funded by the European Union – European Social Fund & National Resources – EPEAEK II, titled: “Development of Methodologies for the detection of pesticides in soils and groundwater – AFYDATOSI”, Key Action: “Strengthening research groups of TEI in subjects of environment and ecology, Programme: EPEAEK II – ARCHIMEDES

3/2012-8/2015

**Participation** in research project (member of the Main Reserach Group of U. Patras) co-funded by the European Social Fund and National Resources-ESPA titled: “Geomechanics and Environment of CO2 Geological Stotrage”. Programme: THALES. Coordinator: Prof. Papamichos, Dpt. of Civil Engineering, Aristotle Univ. of Thessaloniki (U. Patras budget: 133 000 €)

3/2012-2/2015

**Participation** in research project (member of the Main Research Group of TEI of Athens) co-funded by the European Social Fund and National Resources-ESPA titled: “Two-Phase flow in Porous Media: Improvement of the Mechanistic Model DeProF and Implementation in Practical Application”, Programme: ARCHIMEDES III. Coordinator & Scientific Responsible: Assist. Prof. M. Valavanides, Department of Civil Works Technology, TEI of Athens.

6/2012-5/2015

**Scientific Responsible** of Post-Doctoral Fellowship (Dr. Ch. Aggelopoulos) funded by the European Social Fund (ESPA) titled: “Soil remediation with plasma-discharge technologies” (Budget: 150 000 €)

9/2012-8/2014

**Scientific Responsible** of Greek-Hungary bilateral research project between FORTH/ICE-HT and University of Szeged with title: «Development and characterization of carbon nanotube (CNT)-based materials and potential applications to the treatment of polluted water» (Budget: 15 000 €)

7/2013-12/2015

**Co-investigator** in Inter-Institutional research project titled “*Environment and Natural Disasters: New methods for the measurement and improvement of the quality of environment to mitigate natural disasters*” (KRIPIS-PEFYKA)

7/2013-12/2015

**Co-investigator** in Inter-Institutional research project titled “*Advanced Energy Materials*” (KRIPIS-PROENYL)

2/2014-11/2015

**Scientific Responsible** of research project co-funded by the European Social Fund and National Resources-ESPA titled: “Optimizing the properties of nanofluids for the efficient in situ soil remediation-SOILREM”. Programme: ARISTEIA II (EXCELLENCE II). (Budget: 246 000 €)

2017

**Project manager** of FORTH/ICE-HT Laboratory research services agreement with ENERGEAN OIL AND GAS S.A TITLED “West Katakolon Reservoir Characterization” (Cost of Services: 10 000 €).

9/2017-7/2021

**Scientific Responsible** of Inter-Institutional research project: “Innovative Actions in Environmental Research and Development- MIS 5002358” Programme: *Competitiveness, Entrepreneurship & Innovation – ESPA* (Total Budget: 1 200 000 €; FORTH/ICE-HT Budget: 280 000 €).

10/2018-12/2021

**Scientific Responsible** of cooperation project between FORTH/ICE-HT, ECOVAR POWER, ENDECO, “Design, optimization and construction of an energy-autonomous photocatalytic unit for the on-site remediation of wastewater- PHOTOWATER” (INCOMERA-2017), Operational Program of the Region of Western Greece - Promoting Transnational Research Projects for Small and Medium Enterprises – 2018 (Total Budget: 220 000 €; FORTH/ICE-HT Budget: 91 000 €)

6/2018-11/2020

**Scientific Responsible** of cooperation project between FORTH/ICE-HT, University of Patras, SOLAR CELLS, RAPTHS, “Development of materials for energy autonomous units of water matrices purification for their safe reuse - YLENDOR”. Operational Program of the Region of Western Greece-RIS3-MICROELECTRONICS & ADVANCED MATERIALS (Total Budget: 188 000 €; FORTH/ICE-HT Budget: 50 000 €)

1/2018-12/2021

**Participation** in FORTH/ICE-HT project “In situ soil remediation by non-thermal plasma”, Post-doctoral fellowship, Hellenic Foundation for Research and Innovation (HFRI-ELIDEK, Budget: 150 000 €)

1/2019-12/2021

**Participation** in cooperation project between FORTH/ICE-HT and PELCO, “Electricity generation during waste treatment by cold plasma - ELECTROPLASMA”, Operational Program of the Region of Western Greece-RIS3-ENERGY APPLICATIONS (Total Budget: 250 000 €; FORTH/ICE-HT Budget: 100 000 €)

9/2019-9/2022

**Coordinator and Scientific Responsible** of cooperation research project between FORTH/ICE-HT, and POLYECO “Removal of organic wastes from polluted soils with cold plasma-REMPLASMA”, Operational Program «Competitiveness, Entrepreneurship and Innovation»,

under the 1<sup>st</sup> call RESEARCH – CREATE - INNOVATE (project code: T1EDK-02873) (Total Budget: **581 732 €**; FORTH/ICE-HT Budget: **334 232 €**)

1/2020-1/2023

**Coordinator and Scientific Responsible** in FORTH/ICE-HT project “Enhanced oil recovery by polymer-coated nanoparticles / EOR-PNP”; cooperation with University of Waterloo (Canada), and IFP Energies nouvelles (IFPEN, France). *Research projects for the support of Faculty members and Researchers working in the Greek Universities and Research Centers along with the procurement of strategic research equipment*, Hellenic Foundation for Research and Innovation (HFRI-ELIDEK, Budget: **188 000 €**)

8/2020-1/2023

**Scientific Responsible** of cooperation research project between FORTH/ICE-HT, and POLYECO. “Development of a mobile ozonation unit for the remediation of polluted soils and oil-drilling cuttings - OZOREMSOIL” () Operational Program «Competitiveness, Entrepreneurship and Innovation”, under the 2<sup>nd</sup> call RESEARCH – CREATE – INNOVATE (project code: **T2EAK-01447**) (Total Budget: 941 860 €; FORTH/ICE-HT Budget: 288 000 €).

11/2021–11/2025

**Co-investigator / Lab Head** in cooperation research project between FORTH/ICE-HT and eighteen (18) Research and Industrial European Organizations in a cooperation research and innovation project titled: “Strategies for health protection, pollution Control and Elimination of Next generation Refractive Organic chemicals from the Soil, vadose zone and water – SCENARIOS” in the context of the European Green Deal, H2020-2020, LC-GD-8-1-2020 (project code: 101037509) (Total budget: 11 985 716 €; FORTH/ICE-HT budget: 929 625; Lab budget: 286 050 €)

## **PATENTS**

Aggelopoulos C.A., P. Svarnas, C.D. Tsakiroglou, “*Dielectric barrier discharge cold plasma reactor for soil remediation*”, Patent Application No 20140100427 (2015).

## **SUPPLY OF SERVICES**

**Supply of services** to internal (ICE-HT) users and external academic and industrial organizations on the measurement of pore structure properties (Hg porosimetry), rheological properties (stress rheometry), liquid and gas permeation properties (permeameter). Responsible scientist for the operation, maintenance, and data analysis of Hg Porosimeter, Benchtop Permeameter, and Stress Rheometer (Total income: ~ **150 000 €**).

## **HONORS / AWARDS**

- FORTH/ICE-HT Fellowship for Ph.D. studies (1985–1990)
- IFP Post-Doc Fellowship (1994-1995)
- Best Poster Paper Award, Paper SCA2005-58, *International Symposium of the Society of Core Analysts (SCA)*, August 21-25, 2005, Toronto, Canada.
- Best Oral Paper Award, 6<sup>th</sup> Panhellenic Symposium of Porous Materials, Kavala, 9-10 September 2013.
- SPE competition, Proposal presentation, Final Round, Amsterdam, 27/10/2014, Title of proposal: “Assessing the capacity of nanofluids to enhance residual oil recovery

- 3<sup>rd</sup> Applied Research and Innovation Competition, joint initiative of Eurobank and SEV (Hellenic Federation of Enterprises), Final Round, Title: “Cold Plasma Apparatus for the fast, efficient and cost effective remediation of highly polluted soils”, 2015-16.
- 3<sup>rd</sup> Applied Research and Innovation Competition, joint initiative of Eurobank and SEV (Hellenic Federation of Enterprises), 23/2/2016, **2<sup>nd</sup> Prize of Applied Research**, Title: “Cold Plasma Apparatus for the fast, efficient and cost effective remediation of highly polluted soils”.

### **PARTICIPATION IN ADMINISTRATIVE ACTIVITIES**

- Member of the FORTH/ICE-HT Scientific Council (2/2008-7/2018).
- Member of the ICE-HT Working Groups for Research programs (2/2014-1/2014) and Health and Safety (2/2011-Today).
- Member of the Council for Research and Innovation (PSEK) of Sterea Ellada Region (2017-Today)

### **ORGANIZATION OF CONFERENCES**

1. Member of the Scientific Committee of the 1<sup>st</sup> *Internat. Workshop on Groundwater Risk Assessment at Contaminated Sites (GRACOS)*, Tuebingen, Germany, 21-22 February 2002.
2. Member of the Scientific Committee of the 2<sup>nd</sup> *Internat. Workshop on Groundwater Risk Assessment at Contaminated Sites (GRACOS) and Integrated Soil and Water Protection (SOWA)*, Tubingen, Germany, 20-21 March 2003.
3. Member of the Organizing and Scientific Committee of the 1<sup>st</sup> STRESOIL Workshop, Szczecin, Poland, 28-29 September 2006.
4. Member of the Organizing Committee of the 7<sup>th</sup> Panhellenic Scientific Conference of Chemical Engineering, Patras, Greece, 3-5 June 2009.
5. Member of the Organizing Committee of the 4<sup>th</sup> Panhellenic Symposium of Porous Materials, Patras, Greece, 22-23 October 2009.
6. Member of the Scientific Committee of the 5<sup>th</sup> International Congress on Arsenic in the Environment, Buenos Aires, Argentina, 11-16 May 2014.
7. Member of the Organizing Committee of the 10<sup>th</sup> Panhellenic Scientific Conference of Chemical Engineering, Patras, Greece, 4-6 June 2015.
8. Member of the Organizing Committee of the 7<sup>th</sup> Panhellenic Symposium of Porous Materials, Ioannina, 2-4 June 2016.
9. Member of the Scientific Committee of the 6<sup>th</sup> International Congress on Arsenic in the Environment (*As2016*), Stockholm, Sweden, 19-23 June 2016.
10. Organizer of Mini-Symposium “Innovative methods for the characterization, monitoring, and in situ remediation of contaminated soils and aquifers”, Annual International Conference INTERPORE-2019 (Valencia)
11. Organizer of Mini-Symposium “Innovative methods for the characterization, monitoring, and in situ remediation of contaminated soils and aquifers”, Annual International Conference INTERPORE-2020 (Virtual).

## **A. PUBLICATIONS IN REFEREED JOURNALS**

(the corresponding author is underlined)

1. Tsakiroglou, C.D. and A.C. Payatakes, “A new simulator of mercury porosimetry for the characterization of porous materials”, *J. Colloid Interface Sci.*, **137**, 315-339 (1990).
2. Tsakiroglou, C.D. and A.C. Payatakes, “Effects of pore-size correlations on mercury porosimetry curves”, *J. Colloid Interface Sci.*, **146**, 479-494 (1991).
3. Tsakiroglou, C.D. and A.C. Payatakes, “Pore-wall roughness as a fractal surface and theoretical simulation of mercury intrusion/retraction in porous media”, *J. Colloid Interface Sci.*, **159**, 287-301 (1993).
4. Yao, J., J.F. Thovert, P.M. Adler, C.D. Tsakiroglou, V.N. Burganos, A.C. Payatakes, J.C. Moulu and F. Kalaydjian, “Characterization, reconstruction and transport properties of vosges sandstone”, *Revue de L'Institut Francais du Petrole*, **52**(1), 3-21 (1997).
5. Tsakiroglou, C.D., G.B. Kolonis, T.C. Roumeliotis and A.C. Payatakes, “Mercury penetration and snap-off in lenticular pores”, *J. Colloid Interface Science*, **193**, 259-272 (1997).
6. Tsakiroglou, C.D. and A.C. Payatakes, “Mercury intrusion and retraction in model porous media”, *Adv. Colloid Interface Sci.*, **75**, 215-253 (1998).
7. Wilett, M., V.N. Burganos, C.D. Tsakiroglou and A.C. Payatakes, “Gas sensing and structural properties of variously pretreated nanopowder tin (IV) oxide samples”, *Sensors and Actuators B*, **53**, 76-90 (1998).
8. Mastorakos, E., A. Massias, C.D. Tsakiroglou, D.A. Goussis, V.N. Burganos and A.C. Payatakes, “CFD predictions for cement kilns including flame modelling, heat transfer and clinker chemistry”, *Applied Mathematical Modelling*, **23**, 55-76 (1999).
9. Tsakiroglou, C.D. and M. Fleury, “Pore network analysis of resistivity index for water-wet porous media”, *Transport in Porous Media*, **35**, 89-128 (1999).
10. Tsakiroglou, C.D. and M. Fleury, “Resistivity index of fractional wettability porous media”, *J. Petroleum Science & Engineering*, **22**, 253-274 (1999).
11. Tsakiroglou, C.D. and A.C. Payatakes, “Characterization of the pore structure of reservoir rocks with the aid of serial sectioning analysis, mercury porosimetry and network simulation”, *Adv. Water Resour.*, **23**, 773-789 (2000).
12. Theodoropoulou, M., V. Karoutsos, and C. Tsakiroglou, “Investigation of the contamination of fractured formations by non-Newtonian oil pollutants”, *Environmental Forensics*, **2**, 321-334 (2001).
13. Tsakiroglou, C.D. and D.G. Avraam, “Fabrication of a new class of porous media models for visualization studies of multiphase flow processes”, *J. Material Science*, **37**, 353-363 (2002).
14. Tsakiroglou, C.D., “Determination of the transport properties of single fractures with the aid of critical path analysis”, *Industrial & Engineering Chemistry Research*, **41**, 3462-3472 (2002).
15. Tsakiroglou, C.D., “A methodology for the derivation of non-Darcian models for the flow of generalized Newtonian fluids in porous media”, *J. Non-Newtonian Fluid Mechanics*, **105**, 79-110 (2002).
16. Theodoropoulou, M., V. Karoutsos, C. Kaspiris, and C.D. Tsakiroglou, “A new visualization technique for the study of solute dispersion in porous media models” *J. Hydrology*, **274**, 176-197 (2003).
17. Tsakiroglou, C.D., M. Theodoropoulou, V. Karoutsos, D. Papanicolaou, V. Sygouni “Experimental study of the immiscible displacement of shear-thinning fluids in pore networks”, *J. Colloid Interface Science*, **267**, 217-232 (2003).
18. Tsakiroglou, C.D., M. Theodoropoulou, and V. Karoutsos, “Non-equilibrium capillary pressure and relative permeability curves of porous media”, *AIChE J.*, **49**, 2472-2486 (2003).

19. Klint, K.E., P. Gravesen, A. Rosenbom, C. Laroche, L. Trenty, P. LeThiez, F. Sanchez, L. Molinelli and C.D. Tsakiroglou, “Multi-scale characterization of fractured rocks used as a means for the realistic simulation of pollutant migration pathways in contaminated sites: a case study”, *Water, Air and Soil Pollution: FOCUS*, **4**, 201-214 (2004).
20. Tsakiroglou, C.D., V.N. Burganos, and J. Jacobsen, “Pore structure analysis by using nitrogen sorption and mercury intrusion data”, *AIChE J.*, **50**, 489-510 (2004).
21. Tsakiroglou, C.D., “Correlation of the two-phase flow coefficients of porous media with the rheology of shear-thinning fluids”, *J. Non-Newtonian Fluid Mech.*, **117**, 1-23 (2004).
22. Bouras, P., E. Stathatos, P. Lianos, C. Tsakiroglou, “Photodegradation of Basic Blue by highly efficient nanocrystalline titania films”, *Applied Catalysis B: Environmental*, **51**, 273-279 (2004).
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36. Kastanis D., Tasis D., Papagelis K., Parthenios J., Tsakiroglou C., Galiotis C. “Oxidized multi-walled carbon nanotube film fabrication and characterization”, *Adv. Compos. Lett.*, **16**, 243-248 (2007).



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38. Tsakiroglou, C.D. and M.A. Ioannidis, “Dual porosity modeling of the pore structure and transport properties of a contaminated soil”, *Eur. J. Soil Sci.*, **59**, 744-761 (2008).
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41. Aggelopoulos, C.A., and C.D. Tsakiroglou, “The effect of micro-heterogeneity and capillary number on capillary pressure and relative permeability curves of soils”, *Geoderma*, **148**, 25-34 (2008).
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43. Aggelopoulos, C.A., and C.D. Tsakiroglou, “A multi-flowpath model for the interpretation of immiscible displacement experiments in heterogeneous soil columns”, *J. Contam. Hydrol.*, **105**, 146-160 (2009).
44. Tzovolou, D.N., Y. Benoit, F. Haeseler, K.E. Klint, and C.D. Tsakiroglou, “Spatial distribution of jet fuel in the vadoze zone of a heterogeneous and fractured soil”, *Science of the Total Environment*, **407**, 3044-3054 (2009).
45. Mourtas, S., C. Aggelopoulos, P. Klepetsanis, C. Tsakiroglou, S. Antimisiaris “Complex hydrogel systems composed of polymers, liposomes and cyclodextrins. Implications of composition on rheological properties and aging”, *Langmuir*, **25**, 8480-8488 (2009).
46. Spitalsky, Z., Aggelopoulos, C., Tsoukleri, G., Tsakiroglou, C., Parthenios, J., Georga, S., Krontiras, C., Tasis, D., Papagelis, K., Galiotis, C. “The effect of oxidation treatment on the properties of multi-walled carbon nanotube thin films”, *Mat. Sci. Eng. B.*, **169**, 131-138 (2009).
47. Redolfi M., C. Makhoulfi, S. Ognier, S. Cavadias, D. Tzovolou and Ch. Tsakiroglou “Kerosene contaminated soil removal by non-thermal plasma discharge atmospheric” *High Temp. Mat. Proc.*, **13** (3), 373-384, (2009).
48. Tsakiroglou C.D., V. Sygouni, C.A. Aggelopoulos, “A dynamic network-type simulator to investigate the multiphase flow properties of heterogeneous soils”, *Vadoze Zone J.*, **14**, 285-294 (2010).
49. Tsakiroglou, C.D., V. Sygouni, and C.A. Aggelopoulos, “Using multi-level wavelets to correlate the two-phase flow characteristics of porous media with heterogeneity”, *Chem. Eng. Sci.*, **65**, 6452-6460 (2010).
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52. Amiratharaj, E.S., M.A. Ioannidis, B. Parker and C.D. Tsakiroglou, “Statistical Synthesis of Imaging and Porosimetry Data for the Characterization of Microstructure and Transport Properties of Sandstones”, *Transp. Porous Media*, **86**, 135-154 (2011).
53. Tsakiroglou, C.D. “A method to calculate the multiphase flow properties of heterogeneous porous media by using network simulations”, *AIChE J.*, **57**, 2618-2628 (2011).

54. Tsakiroglou, C.D., “A multi-scale approach to model two-phase flow in heterogeneous porous media”, *Transp. Porous Media* **94**, 525-536 (2012).
55. Magga Z., D.N. Tzovolou, M.A. Theodoropoulou, C.D. Tsakiroglou, “Combining experimental techniques with non-linear numerical models to assess the sorption of pesticides on soils”, *J. Contam. Hydrology* **129-130**, 62-69 (2012).
56. Tsakiroglou, C.D., K.E.S. Klint, M.A. Theodoropoulou, B. Nilsson, and C.A. Aggelopoulos, “From aperture measurements to hydraulic properties of fractures”, *Geoderma*, **181-182**, 65-77 (2012).
57. Aggelopoulos, C.A., and C.D. Tsakiroglou, “Effects of Micro-Heterogeneity and Hydrodynamic Dispersion on the Dissolution Rate of Carbon Dioxide in Water-Saturated Porous Media”, *International Journal of Greenhouse Gas Control* **10**, 341-350 (2012).
58. Tsakiroglou, C.D., C.A. Aggelopoulos, D.N. Tzovolou, M. Theodoropoulou, D.G. Avraam, “Dynamics of surfactant-enhanced oil mobilization and solubilization in porous media: experiments and numerical modeling”, *Int. J. Multiphase Flow* **55**, 11-23 (2013).
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60. Aggelopoulos, C.A., C.D. Tsakiroglou, S. Ognier and S. Cavadias, “Ex situ soil remediation by cold atmospheric plasma discharge”, *Procedia Environmental Sciences* **18**, 649-656 (2013).
61. Tsakiroglou, C.D. “Computation of the two-phase flow properties of intermediate-wet porous media: a pore network approach”, *Can. J. Chem. Eng.* **92**, 515-523 (2014).
62. Terzi, K., I. Bountas, C.A. Aggelopoulos and C.D. Tsakiroglou, “Effects of Carbon Dioxide on the Mobilization of Metals from Aquifers”, *Environmental Science and Technology*, **148 (8)**, 4386-4394 (2014).
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