

Efsevia Fragkou, PhD

Dipl. Chemical Engineer
MSc Petroleum Engineer

Personal Information

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Professional Experience

Institute of Geoenergy (FORTH/IG): 01/11/2022 – present

Research Associate

Participation in Projects:

BLUEQ- Applied Solutions for Monitoring Coastal Habitats and Quantifying Blue Carbon Storage: An Integrated Approach for Sustainable Ecosystem Management
(**Principal Investigator:** Prof. Ioannis Yentekakis/**Funded by:** Interreg IPA ADRION)

- Preparation of protocols for sediment sample treatment and storage for blue carbon quantification.
- Contribution to the design and elaboration of the Joint Solution and sampling expeditions.
- Contribution in deliverables and reports.

X-PRESS- Extreme environments: High pressure sampling and experimentation system for deep-sea hydrocarbon releases
(**Principal Investigator:** Emer. Prof. Nicolas Kalogerakis/**Funded by:** HFRI)

- Participated in two offshore deep-sea sampling expeditions with FRI (Ro-Ro/Passenger Ship MEGALOCHARI, Chalkidiki, 04/2025) and HCMR (R/V Aegaeo, SE Aegean and Libyan Sea, 07/2025).
- Conducted high-pressure hydrocarbon biodegradation experiments with deep-sea microbial consortia (10–30 MPa).
- Designed and assembled high-pressure experimentation systems; developed protocols for high pressure experimentation with undisturbed deep-sea microbial communities.

TWINNING- Twinning to Sustainable Energy Transition

(Principal Investigator: Dr. Emmanuel Stamatakis/**Funded by:** European Union)

- Participation in Project Meetings and Deliverables regarding Underground Gas Storage
- 2 week visit in University of Stavanger for UGS simulations
- 11 weeks MOOCs from IFP School

Technical University of Crete-Special Account for Research Funding:

01/12/2019 – 31/08/2022

Chemical Engineer

Participation in Projects:

DEEPSEA – Bioremediation of hydrocarbon releases in Deep Sea (grant #1510)

(Principal Investigator: Dr. Eleftheria Antoniou/**Funded by:** HFRI, GSRT)

- Protocols for operation, sampling, and experimentation with high-pressure reactors.
- High-pressure hydrocarbon biodegradation experiments using different bioremediation agents (dispersants, nutrients).
- Analysis and visualization of oil-associated microbial communities
- Hydrocarbon extraction and sample analysis with GC-MS.
- Screening for biosurfactant production from deep-sea consortia under high pressure conditions.
- Plume biodegradation modelling.
- Data processing and dissemination of results.

HEALMED – Self-healing capabilities of the Eastern Mediterranean Sea from accidental oil releases in deep waters (grant #1874)

(Principal Investigator: Dr. Evangelia Gontikaki/**Funded by:** HFRI, GSRT)

- Conducted hydrocarbon biodegradation experiments under varying conditions of pressure, medium, hydrocarbon type, incubation vessels.
- Hydrocarbon extraction and sample analysis with GC-MS.
- Screening for biosurfactant production from isolated deep-sea strains.
- Data processing and dissemination of results.

Remediation of Marine Polluted Sediments (Project Code: T1EDK-04256, WAVE2ENERGY)

(Principal Investigator: Emer. Prof. Nicolas Kalogerakis/ **Funded by:** European Union and EPAnEK)

- Literature review, aeration system design, and execution of mesocosm aeration experiments to remediate polluted sediments.

Traineeships/Internships

15/05/2023-26/05/2023: Underground Gas Storage Traineeship

University of Stavanger, Department of Energy Resources, Stavanger, Norway

- Underground Gas Storage Simulations taking into consideration microbial activity, using Dumux, an open-source simulator for flow and transport processes in porous media.

04/03/2024-29/03/2024: Erasmus+ Student Mobility for Traineeship

Norwegian Meteorological Institute, Bergen, Norway

- Deep-Sea Oil Spill Modelling and Biodegradation using OpenDrift, an open source code developed by MET Norway.

24/06/2024-05/07/2024: Erasmus+ Student Mobility for Traineeship

Cardiff University, Cardiff, Wales

- Deep-Sea Oil Spill Modelling and Biodegradation using OSCAR, a modelling tool developed by SINTEF.

01/04/2015 – 30/10/2016: Diploma Thesis Research

FORTH/ICE-HT, Patras, Greece

Project: Fractionation of lignocellulosic biomass for hydrogen and methane production

(Principal Investigator: Prof. Gerasimos Lyberatos/ Funded by: GSRT/ Contract #1455)

- Research on metabolic biofuel production (methane, hydrogen) from willow sawdust.
- Analytical work: BMP/FHP assays, HPLC, GC, VFA, phenolic content, lignocellulosic composition, TNK.
- Biological/chemical pretreatments of lignocellulosic biomass.
- Contributed to project publications.

01/06/2014 – 31/10/2014: Quality Control Intern

SAMARIA ET.ANAP. S.A., Stylos Chania, Greece

- Daily microbiological and chemical analysis of water samples.
- Raw material inspections and compliance with ISO & HACCP standards.

Teaching Experience

- **15/04/2024 – 30/06/2024**

Teaching of tutorial exercises– Biochemical Engineering & Environmental

Biotechnology Laboratory

School of Chemical & Environmental Engineering, Technical University of Crete, Chania, Greece

- Delivered undergraduate laboratory sessions for the “Biochemical Processes” class.

- **01/03/2020 – 30/04/2020**

Teaching of tutorial exercises– Renewable Energy & Sustainable Energy Systems

Laboratory

School of Chemical & Environmental Engineering, Technical University of Crete, Chania, Greece

- Preparation of Notes and Learning Material for the “Renewable Energy Sources” class.

Education

- **PhD in Chemical and Environmental Engineering** – Laboratory of Biochemical Engineering & Environmental Biotechnology (BEEB), School of Chemical and Environmental Engineering, Technical University of Crete (11/2020 – 07/2026)
PhD Thesis: Integrated approach for hydrocarbon degradation in Deep Sea environments, using different bioremediation agents
- **MSc in Petroleum Engineering**- School of Mineral Resources Department, Technical University of Crete (10/2017 – 01/2019)
Master Thesis: LNG production technologies and process simulation.
- **Diploma in Chemical Engineering**- University of Patras (09/2011 – 10/2017)
Diploma Thesis: Effect of Biological and Chemical Pretreatment on Lignocellulosic Biomass (Willow Sawdust) for the Production of Biofuels, Methane, and Hydrogen.

Grants & Fellowships

ISME Scholar Mobility Fund (International Society for Microbial Ecology)

Supported research on simulating deep-sea hydrocarbon plumes and biodegradation using advanced modeling tools

Language Skills

Greek: Native Speaker/English: Proficient (C2)/French: Basic (A1)/Norwegian: Basic

Digital Skills

Data Analysis: Python, MATLAB, R, ANSYS, Excel

Process Simulation: Aspen HYSYS, MS Visio

Petroleum Engineering/Underground Storage: Petrel, CMG, Eclipse, Prosper, EazyTrace, DuMux

Office Tools: MS Office (Word, Excel, PowerPoint, Visio), ECDL Certificate

Publications

- Fragkou, E.; Antoniou, E.; Gontikaki, E.; Charalampous, G.; Kalogerakis, N. Rhamnolipid Production under High Pressure by a Deep-Sea Hydrocarbon-Degrading Consortium. *Marine Pollution Bulletin* **2026**.
<http://dx.doi.org/10.2139/ssrn.6869066>
- Charalampous, G.; Fragkou, E.; Kalogerakis, N.; Antoniou, E.; Gontikaki, E. Diversity links to functionality: Unraveling the impact of pressure disruption and culture medium on crude oil-enriched microbial communities from the deep Eastern Mediterranean Sea. *Marine Pollution Bulletin* **2024**, *150*, 116275.
<https://doi.org/10.1016/j.marpolbul.2024.116275>
- Antoniou, E.; Fragkou, E.; Charalampous, G.; Marinakis, D.; Kalogerakis, N.; Gontikaki, E. Emulating Deep-Sea Bioremediation: Oil Plume Degradation by Undisturbed Deep-Sea Microbial Communities Using a High-Pressure Sampling and Experimentation System. *Energies* **2022**, *15*, 4525.
<https://doi.org/10.3390/en15134525>
- Spanoudaki, K.; Antoniou, E.; Fragkou, E.; Charalambous, G.; Gontikaki, E.; Kalogerakis, N. Modelling of deep-sea oil spill releases incorporating hydrocarbon biodegradation kinetic rates of the Eastern Mediterranean deep-sea consortia. *EGU General Assembly 2022*, Vienna, Austria, 23–27 May **2022**.
<https://doi.org/10.5194/egusphere-egu22-10236>, 2022.
- Fragkou, E.; Antoniou, E.; Daliakopoulos, I.; Manios, T.; Theodorakopoulou, M.; Kalogerakis, N. In Situ Aerobic Bioremediation of Sediments Polluted with Petroleum Hydrocarbons: A Critical Review. *J. Mar. Sci. Eng.* **2021**, *9*, 1003.
<https://doi.org/10.3390/jmse9091003>
- Charalampous, G.; Fragkou, E.; Kormas, K.A.; Menezes, A.B.D.; Polymenakou, P.N.; Pasadakis, N.; Kalogerakis, N.; Antoniou, E.; Gontikaki, E. Comparison of Hydrocarbon-Degrading Consortia from Surface and Deep Waters of the Eastern Mediterranean Sea: Characterization and Degradation Potential. *Energies* **2021**, *14*, 2246. <https://doi.org/10.3390/en14082246>
- Alexandropoulou M.; Antonopoulou G.; Fragkou E.; Ntaikou I.; Lyberatos G. Fungal pretreatment of willow sawdust and its combination with alkaline treatment for enhancing biogas production, *Journal of Environmental Management* **2017**; 203(2):704-713. <https://doi.org/10.1016/j.jenvman.2016.04.006>

Seminars and Schools

- **CO₂ Industry - Carbon Capture, Storage & Utilization (CCS & CCU)**
(National and Kapodistrian University of Athens, 2021 – 2022)
- **HTML 5 and JavaScript: First Steps in Web Development** (National and Kapodistrian University of Athens, 2021 – 2022)
- **Safety Management & Environmental Protection of Industrial Enterprises**
(National and Kapodistrian University of Athens- Center for Continuing Education and Lifelong Learning, 2020 – 2021)
- **2nd Summer School on “Energy Transition & Geothermal Energy”** (30/06/2025-04/07/2025, FORTH-IG)
- **1st Summer School on “Energy Transition”** (01/07/2024-05/07/2024, FORTH-IG)
- **MOOCs (Massive Open Online Courses) by IFP School:** (11-weeks program 2022-2023).
(<https://twinn2set.ig.forth.gr/moocs>)

Conferences/Workshops/Events

Oral Presentations

- **9th European Bioremediation Conference _EBC-IX** (12/06/2025 – 17/06/2025, Chania)
- **5th PhD Conference_School of Chemical and Environmental Engineering**
(01/04/2024-02/04/2024)
- **4th PhD Conference_School of Chemical and Environmental Engineering**
(06/04/2023-07/04/2023)
- **3rd PhD Conference_School of Chemical and Environmental Engineering**
(01/04/2022)
- **8th European Bioremediation Conference _EBC-VIII** (12/06/2022 – 17/06/2022, Chania)
- **13th Panhellenic Scientific Conference in Chemical Engineering_13th PESXM**
(02/06/2022 – 04/06/2022, Patras)

Poster Presentations

- **9th International Conference of Mikrobiokosmos** (16/12/2021 – 18/12/2021, Athens)
- **8th International Symposium on Applied Microbiology and Molecular Biology in Oil Systems_ISMOS8** (08/06/2021 – 11/06/2021, Online Conference)

Participation

- **Innovation Days of the Region of Crete_InnoDays 2023** (24/11/2023 – 26/11/2023, Heraklion)
- **8th International Society for Microbial Electrochemistry and Technology_ISMET8** (19/09/2022 – 23/09/2022, Chania)