Sustainable Water Management

Doctoral Programme (Water4All)

Title of the PhD Project	Synthesis and characterization of novel nano-layered catalysts for catalytic degradation of hazardous organic contaminants under visible light irradiation
Acronym	Layered catalysts
Research Fields of the Project	2D materials, Nanocatalysts, Photocatalysis, Sonocatalysis
Keywords	Layered materials, 2D materials, Nanomaterials, Pharmaceuticals, Catalystic processes
Host Institution, Department and Campus Location	Nano Science and Nano Engineering Department, Istanbul Technical University, Maslak, 34469 Istanbul, Turkey
PhD Awarding Institution and Graduate Programme	Istanbul Technical University, PhD in Nano Science and Nano Engineering
Name and Affiliation of Main Supervisor	Prof. Dr. Alireza Khataee Department of Chemical Engineering & Nano Science and Nano Engineering Department, Istanbul Technical University, Maslak, 34469 Istanbul, Turkey
Name and Affiliation of Co-Supervisors	Doç. Dr. Hatice Eser Ökten Department of Environmental Engineering, Izmir Institute of Technology, Izmir, Turkey Prof. Dr. Mustafa M. Demir

	Department of Material Science and Engineering, Izmir Institute of Technology, Izmir, Turkey
Research Environment and Infrastructure	Istanbul Technical University (ITU) and Izmir Institute of Technology has all the facilities for synthesizing, characterizing, and testing layered catalysts. These facilities include: (I) for synthesis: precursors, solution-based and hydrothermal synthesis facilities; (II) for AOPs applications: ultrasonic baths and probes, different light sources; and (II) for characterization: XRD, SEM-EDX, BET, RAMAN, DRS, ICP, Spectrophotometers, GCMS. The TEM and XPS are available at service laboratories. During the visit to Zhejiang Normal University in China, the candidate will also have access to advanced laboratories for preparing nanomaterials and their characterization equipments.
Scientific Context of the Project	The project deals with layered nanomaterials. Some 2D materials would be provided for possible applications in the degradation of hazardous organic contaminants through catalytic processes under visible light irradiation.
Brief Workplan	(1 year) Literature review and design of experimental setups (1 year) Synthesis, functionalization, and characterization of layered nanomaterials (1 year) Application of prepared layered nanomaterials in the advanced oxidation processes under visible light (1 year) Study the main parameters and mechanism of processes
Innovative Aspects of the Project	The project deals with state-of-the-art nano-layered catalysts preparation for catalytic degradation of hazardous organic contaminants under visible light irradiation.

Training Opportunities of the Project	The PhD students will be trained in preparing and characterizing novel nano-layered catalysts and their activation strategies to be sensitive to visible light. In addition, the doctoral candidates will be trained on the structure, electronic, magnetic, vibrational and optical properties of nanomaterials. They will be trained on nanomaterials characterization instruments such as TEM, SEM, XRD, XPS, and BET.
Interdisciplinary Aspects	
Intersectoral Mobility **☐ Short Visit** **☐ Secondment**	TBD
Intersectoral Mobility **☐ Short Visit** **☐ Secondment**	TBD
International Academic Secondment	Host Supervisor: Prof. Yasin Orooji Host Institution: Zhejiang Normal University, China Host Department: College of Geography and Environmental Sciences Duration: 6-12 months Estimated Time of Mobility: 2nd or 3rd year of the project

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Main Supervisor	
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Co-supervisors	
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Brief CV	**Prof. Dr. Mustafa M. DEMİR** **E-mail:** mdemir@iyte.edu.tr **Academic Degrees** Ph.D. Materials Sciences and Engineering, Sabancı University, Türkiye 2004 M.Sc. Materials Sciences and Engineering, Sabancı University, Türkiye 2001 B.Sc. Chemistry, Boğaziçi University, Türkiye 1999 **Professional Networks** Google Scholar: https://scholar.google.com/citations?user=OX8Cq2wAAAAJ&hl=en ResearchGate: https://www.researchgate.net/profile/Mustafa-Demir-10 Scopus: https://www.scopus.com/authid/detail.uri?authorId=13907034500 ORCID: https://orcid.org/0000-0003-1309-3990