Sustainable Water Management

Doctoral Programme (Water4All)

Title of the PhD Project	Synthesis of solvent-free polyurethane and its coating application for water-pipes: Fabrication of polyurethane resins including novel polyols
Acronym	S'less polyurethane
Research Fields of the Project	Chemistry, Chemical Engineering, Material Science and Engineering
Keywords	Solventless polyurethane, biocompatible, clean water
Host Institution, Department and Campus Location	Izmir Institute of Technology, Department of Materials Science and Engineering, Urla/Izmir
PhD Awarding Institution and Graduate Programme	Izmir Institute of Technology, Graduate School, PhD in Materials Science and Engineering
Name and Affiliation of Main Supervisor	Prof. Dr. Mustafa M. Demir (IZTECH)
Name and Affiliation of Co-Supervisors	Dr. Merve Demirkurt (Kanat Paint & Coatings)
Research Environment and Infrastructure	The selected candidate will have access to the research infrastructure available at IZTECH. IZTECH has an integrated research center that includings twelve independent centers such as Materials Research Center, Nuclear Magnetic Resonance Center, Environmental Research and Development Center, etc. These Centers has required infrastructure to conduct this particular project. https://tam.iyte.edu.tr/en/iztech-irc/
Scientific Context of the Project	Kanat Paint & Coatings has been an active world-wide company for more than 30 years. It has produced various types of polymeric coatings such as epoxy, alkyd, and polyurethane for many different sectors. The majority of the raw materials has been imported, which is may the biggest obstacle the company has been faced with. The synthesis of polymer and their precursors is a real challenge for the company. In this particular project, the synthesis of polyols and polyurethanes for water transport process will be aimed. Moreover, the kinetics of curing will be studied in detail since the curing time is long for the real field applications.

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Brief Workplan	The main aim of this thesis is to develop novel Polyurethane coatings that can be used for the inner surface of the metallic water pipelines. The thickness of the coating, time for crosslinking, and environment-dependent properties of nanostructured biocopatible film. The tentative yearly workplan is presented below: • **1 st Year** Synthesis of solventless polyurethane: Kinetics of crosslinking • **2 nd Year** Molecular characterization of polyurethane and structural characterization of coatings • **3 rd Year** Application of the coating on the complex metallic substrate in the field.
Innovative Aspects of the Project	The outcomes of the project will help develop innovative and feasible design for environmentally benign solventless polyurethane caotings on the inner surface of metallic water pipelines. For the application of the coatings in the field requires short curing time and biocompatible film structure over concave shape of the stainless stell pipelines.
Training Opportunities of the Project	The selected candidate will be offered various training opportunities in the convergence of chemitry, materials science, process engineering. The supervisory team and student will discuss and form a training plan at the start of the PhD, considering both personal interests and scientific needs.
Interdisciplinary Aspects	The selected candidate will be supervised by two experts in polymer chemistry and materials science and engineering. He/she will be working towards addressing multifaceted and multidisciplinary sub-topics that sit at the intersection of chemistry, advanced materials and process engineering
Intersectoral Mobility ☐ **Short Visit** ☒ **Secondment**	**Host** Kanat Paint & Coatings **Context of Mobility** Entrepreneurship Training, Thematic Pre-incubation Program
Intersectoral Mobility ☒ **Short Visit** ☐**Secondment**	**Hosts** i) Kanat Paint & Coatings ii) Taherna
International Academic Secondment	Host Supervisor: Prof. Rafael Munoz Espi Host Institution: University of Valencia, Spain

	Host Department: Department of Chemistry Duration: 6 months Estimated Time of Mobility: 2 nd Year

Main Supervisor	
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
Co-supervisors	
Brief CV	**Dr. Merve DEMİRKURT** **E-mail:** merved@kanatboya.com.tr **Academic Degrees** Ph.D. İzmir Institute of Technology, Türkiye 2022 M.Sc. İzmir Institute of Technology, Türkiye 2017 B.Sc. İzmir Institute of Technology, Türkiye 2014

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