

Name and Surname: Arif Enes Karaca

## **EDUCATION SUMMARY**

- 1- YILDIZ TECHNICAL UNIVERSITY (ISTANBUL, TURKEY) / DEPARTMENT OF BIOENGINEERING (100% ENGLISH) / BACHELOR'S DEGREE / 2016-2021

During my bachelor's degree, I had lessons in a combination of material engineering, polymer engineering, chemical engineering, and molecular biology. I developed different types of projects that are supported by the Turkish government around bioplastics and medicine. To complete these projects and my thesis, I worked in a chemistry laboratory for 2 years. Especially, extraction of cellulose and silica from rice husks via different chemical methods, development of cellulose based bioplastic films for applications of flexible packaging and wound dressing, and characterization of materials with FT-IR, TGA, DTA, XRD, SEM-EDS, etc. were my primary responsibilities.

- 2- EGE UNIVERSITY (IZMIR, TURKEY) / DEPARTMENT OF BIOENGINEERING / MASTER'S DEGREE / 2021-2023

During my master's degree, I worked in the private sector around the bioplastic sector and also continued my education at Ege University. After I completed lessons in 1 year, I started to work on the master's degree thesis which is related to the development of non-toxic PHB-Cellulose-Chitosan wound dressings. Material characterizations and *in vivo cell tests* (scratch assay, MTT Cytotoxicity, and antimicrobial activity) were carried out in the scope of the thesis.

- 3- ROME3 UNIVERSITY (ROME, ITALY) / DEPARTMENT OF INDUSTRIAL, ELECTRONIC, AND MECHANICAL ENGINEERING / December 2024 (Continue)

Two months ago, I commenced my PhD studies at Rome Tre University, a program expected to span approximately three years. My research will primarily focus on conventional and biodegradable polymers, with particular emphasis on their applications in extrusion compounding, blown film, injection molding, cast film, and extrusion coating processes. The university is equipped with a comprehensive range of advanced analytical instruments, including FT-IR, UV-VIS, DSC, DMA, SEM, XRD, MFR, rheometers, ash content analyzers, density meters, HDT/VICAT testers, tensile testers, and Izod impact testers, enabling in-depth characterization of the chemical and physical properties of polymers. My PhD research will aim to develop biodegradable compounds tailored to meet industrial demands, and I intend to publish at least nine scientific articles during the course of my PhD.

## **PUBLICATIONS**

- 1- [Karaca, Arif Enes, et al. "The simultaneous extraction of cellulose fiber and crystal biogenic silica from the same rice husk and evaluation in cellulose-based composite bioplastic films." Polymer Composites 43.10 \(2022\): 6838-6853.](#)
- 2- Arif Enes Karaca (MSc student; Ege University Dept. Bioengineering, Izmir, TR) A.E. Karaca, C. Özel, A. Özarslan, S. Yücel. 45S5 Bioactive glass reinforced microcrystalline cellulose-polyvinyl alcohol based composite membrane wound dressing, The Proceedings of the 26th International Biomedical Science and Technology Symposium, 2022
- 3- Arif Enes KARACA, Ecenaz Merve NAMLI, Associate Professor Aylin ŞENDEMİR, Ege University, Production and characterization of antimicrobial, biodegradable, and environmentally friendly composite wound dressing based on poly-3-hydroxybutyrate-chitosan-cellulose, Istanbul International Modern Scientific Research Congress, 2023

## **PROJECTS**

- 1- TUBITAK 2209-A University Students Research Projects Support Program / Silica reinforced Cellulose Based Bioplastic Film from Rice Husk / 2020
- 2- TUBITAK 2209-B Industry-Oriented Undergraduate Research Projects Support Program / Production and Characterization Of 45S5 Bioactive Glass Supported Cellulose Fiber – Polyvinyl Alcohol (PVA) Based Composite Hydrogel Skin Tissue Scaffolds / 2021
- 3- KOSGEB / Development of Bioplastic Compound Having High Carbon Content with Perspective of Circular Economy / 2022
- 4- TUBITAK 1507 / Thermally Conductive and Electrically Insulative PC Based Compound Production for Plastic Parts of Electrical Vehicles / 2023
- 5- TUBITAK 1832 / Use of Nanocellulose as Bio-Based Filler in Traditional and Biodegradable Plastic Compounds Production with Compatibilizer Addition / 2024

## **PROFESSIONAL SUMMARY**

### 1- Brosbio / R&D Engineer / Izmir, Turkey / August 2021 – July 2022

Brosbio is a start-up company which is working on bioplastic production and distribution. They are first and only member of European Bioplastics in Turkey. My role was development and production of bioplastic compound containing PBAT, Bio-PE, and agricultural wastes. I had prepared the formulation and operated twin screw extruder by setting working parameters to produce bioplastic compounds. Additionally, we bought different type of biopolymers from Asian region and then supplied them into Turkish and European market as well.

### 2- Sunar NP / R&D Engineer / Adana, Turkey / August 2022 – July 2023

Sunar NP is the first manufacturer of TÜV Austria Certified thermoplastic starch and biopolymer compounds in Turkey. They are producing thermoplastic starch by blending modified starch and different types of plasticizers via twin screw extrusion. Then, the thermoplastic starch is used as a masterbatch in the production of biopolymer compounds (PLA, PBAT, and PBS) up to 40%. I was responsible for the development of new biopolymer compounds for the application of single-use packaging. I was preparing new formulations for different applications, and then operating the twin screw extruder. After producing the biopolymer compounds, we tested the quality of these compounds by using melt flow index, density, moisture absorption, TGA, DSC, and blown film extrusion. After producing the film from the biopolymer compounds, we checked the mechanical properties of the films in terms of tensile strength, elongation at break, and tensile modulus. Additionally, I was operating the certification process with TÜV Austria.

### 3- Tisan Engineering Plastics / R&D Engineer / İstanbul, Turkey / July 2023 – May 2024

Tisan is one of the best engineering plastics companies in Turkey. They have 45 years of history in the plastic industry. They are blending all types of conventional plastics (PE, PP, PET, PBT, PA6, PA66, PC, PS etc.) with fillers such as flame retardants, talc, calcium carbonate, glass fiber etc. via twin screw extrusion. After the production of polymer compounds, the injection molding process is carried out and then quality control analyses are applied to injected samples. Furthermore, they have well well-equipped R&D and quality control laboratory. Izod impact resistance, charpy impact resistance, tensile properties, glow wire flammability index, thermal conductivity, Shore-D, TGA, DSC, SEM-EDS, FT-IR, etc. I can use all of these devices and comment on the results of the analyses as well. My responsibilities at Tisan are to develop new

polymer compounds for injection molding and extrusion applications, characterize the unknown samples to find composition, check the technical properties of injected samples, and find alternative raw material and additives.

4- Rome3 University / Researcher / Rome, Italy / May 2024 – December 2024

At the Department of Industrial, Electronic, and Mechanical Engineering at Rome Tre University, we focus on the development of polymer and biopolymer compounds. Our laboratory is well-equipped with state-of-the-art facilities for both compound production and characterization. I have contributed to various academic and industrial projects, where my responsibilities included both the production of polymer and biopolymer compounds (e.g., PE, PP, PS, PBAT, PBS, PBSA, PLA, PHA, etc.) using twin-screw extruders of various scales and the characterization of their physical, chemical, and mechanical properties. These compounds are further processed using techniques such as blown film extrusion, injection molding, cast film extrusion, and thermoforming, depending on the intended applications. The characterization involves advanced methods, including FT-IR, SEM, UV-VIS, DMA, DSC, HDT/VICAT, MFR, Izod impact testing, rheometry, tensile testing, ash content analysis, density measurement, and chemical inertness testing.

## **WEBINAR / SEMINAR / FAIR / CONFERENCE**

- 1- World Biopolymers and Bioplastic Innovation Conference (Germany, Berlin)
- 2- European Bioplastics Conference 2023 (Germany, Berlin)
- 3- Eurasia Packaging Fair (Turkey, İstanbul)
- 4- Plast Eurasia Fair (Turkey, İstanbul)
- 5- Innovations on Sustainable Materials for Textiles, Coatings, Films, and other Wide Use Applications (Germany, Düsseldorf)
- 6- International Fiber and Polymer Research Symposium (Turkey, Yalova)
- 7- Bluepha PHA Global Product Launch Event Announcement (China, Beijing)
- 8- How to Succeed with Bioresin for Injection-Molded Applications