



ISTANBUL AYDIN UNIVERSITY FACULTY OF PHARMACY

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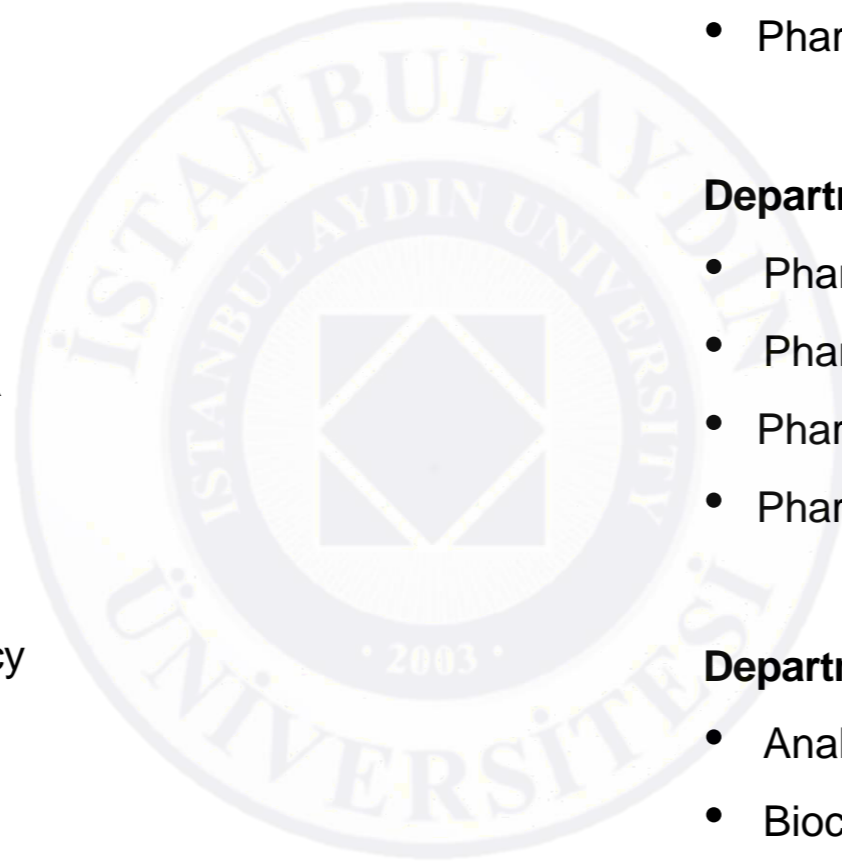
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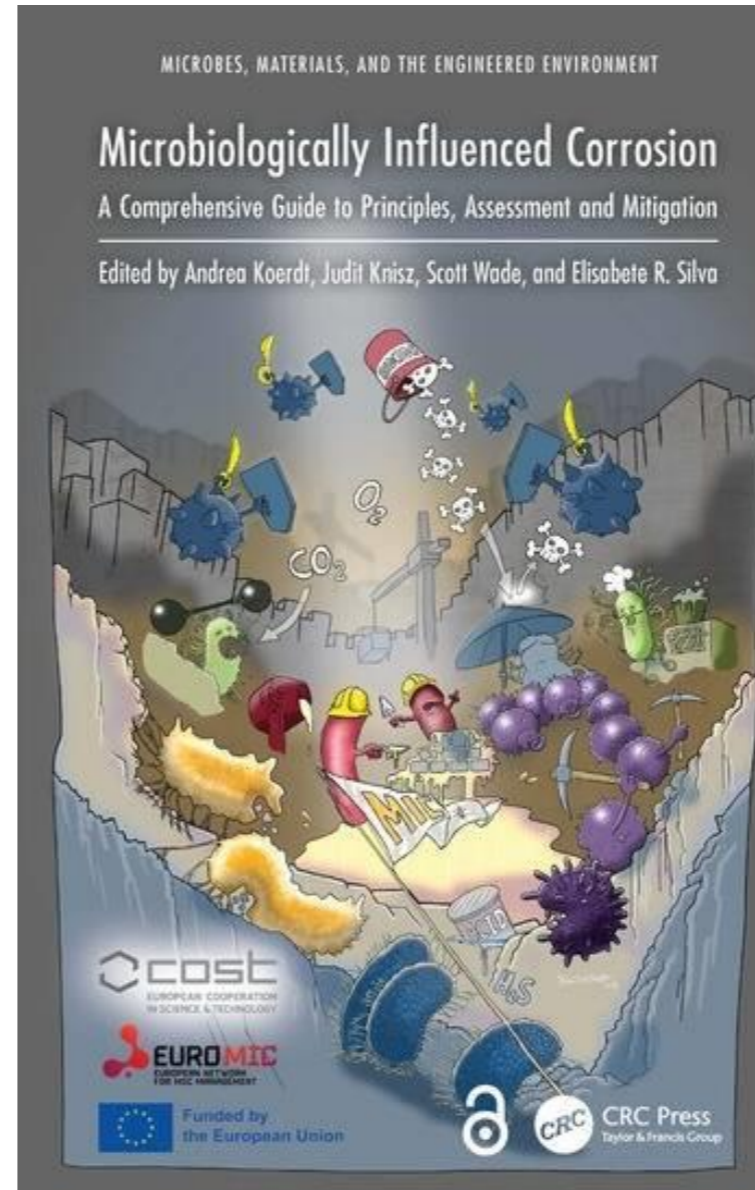
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- Analytical Chemistry
- Biochemistry
- Pharmaceutical Microbiology



A chapter authored by our Department of Pharmaceutical Microbiology faculty member Assist. Prof. Dr. Tuğçe Tüccar, titled **“Microbiologically Influenced Corrosion: Principles and Current Perspectives,”** has been published in the book *Microbiologically Influenced Corrosion*.



2 Microbiologically Influenced Corrosion Principles and Current Perspectives

Judit Knisz, Zsuzsanna Kecskés Maconkai, Tuğçe Tüccar, and Tuba Unsal

2.1 BACKGROUND

Microbiologically influenced corrosion (MIC) is likely the least understood and probably the most complex corrosion phenomenon affecting a wide range of industrial sectors. It involves the interaction of microorganisms with materials, leading to accelerated corrosion rates and significant economic and safety impacts. One of the main reasons it is so difficult to tackle this phenomenon is that MIC is not a single mechanism of corrosion, rather it is a combination of various mechanisms through which microorganisms can influence the kinetics of corrosion reactions. As such, MIC can be referred to as the “cancer of metals.” This analogy nicely summarizes all the obstacles related to MIC, because much like cancer in humans, MIC is not caused by a single factor but arises from a complex interplay of underlying causes and conditions. Just as cancer results from genetic mutations, environmental triggers, and cellular dysfunctions, MIC stems from the intricate interactions between microbial activity, environmental conditions, and material susceptibility. Exploring this analogy highlights the systemic and multifactorial nature of MIC, emphasizing the challenges in its diagnosis, prevention, and mitigation. Unless we understand all aspects of this complex phenomenon, we will not stand a chance to “cure” it. Moreover, as with cancer, there is no universal cure or single solution to MIC. Each case demands a unique diagnosis, and a targeted treatment plan tailored to its specific circumstances. Beyond its technical complexity, MIC has far-reaching societal consequences. Failures in infrastructure due to undetected or unmanaged MIC can endanger public safety, disrupt essential services like water and energy supply, and result in environmental pollution. As such, addressing MIC is not only an industrial challenge but also a matter of public interest and social responsibility.

An added challenge related to MIC is the unpredictability of certain events and environmental changes, such as extreme weather conditions, unexpected temperature fluctuations, or human errors, like the accidental introduction of oxygen into an otherwise anoxic system. Even seemingly minor factors can significantly alter the

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Evaluation Meeting Held with Turkmen Students Within the Scope of International Students

An evaluation meeting was held with Turkmen students on April 6, 2026, at the Dean's Office with the participation of Prof. Dr. Ayşe Nurten Özdemir and Assist. Prof. Dr. Gizem Sena Elagöz. During the meeting, views were exchanged on improving the academic success of students, and information was provided regarding methods to support academic achievement, as well as students' rights and social opportunities within the university.

The students stated that despite the challenges they experienced during the first semester, they gradually adapted to university life and were satisfied with their current situation. The faculty administration also emphasized that the necessary efforts would continue in line with the students' requests and feedback.





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Disaster Awareness Training

A “Disaster Awareness Training” was organized by the Istanbul Aydın University Aydın ADEC Club on April 8, 2026, between 14:00 and 16:00, with disaster management expert Berkhan Kuşoğlu as the speaker.

Within the scope of the training, the precautions that should be taken before a disaster, the appropriate behaviors to be displayed during a disaster, and the necessary actions to be taken after a disaster were discussed. The importance of acting consciously against disaster types frequently encountered in our country, especially earthquakes, fires, and floods, was emphasized to the participants. In addition, participants were informed about preparing emergency kits, basic first aid knowledge, and effective communication methods during crisis situations. The training was completed as a productive event that contributed to increasing the awareness levels of the participants.





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Faculty of Pharmacy Academic Staff Attended the EURIE 2026 Opening Ceremony

The 11th Eurasian Higher Education Summit, EURIE 2026, was held between April 7–9, 2026, at the Istanbul Lütfi Kırdar International Convention and Exhibition Center. The summit, organized under the leadership of our Chairman of the Board of Trustees, Prof. Dr. Mustafa Aydın, brought together universities, academics, and sector representatives from various countries around the world. As members of the Faculty of Pharmacy academic staff and students, participation was provided in the opening ceremony held at the Anadolu Auditorium on April 9, 2026, between 09:30 and 12:30. During the protocol speeches, significant evaluations regarding the future of higher education were shared.

EURIE 2026 also offered valuable collaboration and networking opportunities to participants through panels and sessions focusing on topics such as internationalization, artificial intelligence, research collaborations, Erasmus+, and sustainability.





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Faculty Representation at the Seminar of Nobel Laureate Chemist Prof. Dr. Morten Meldal

Assist. Prof. Dr. Shafeek Buhlak from the Department of Pharmaceutical Chemistry represented our faculty at the seminar delivered by Prof. Dr. Morten Meldal, recipient of the 2022 Nobel Prize in Chemistry and one of the pioneers of click chemistry. The event was held on April 10, 2026, at 10:00 at the Gebze Technical University Congress and Culture Center.

During the seminar, the fundamental principles of click chemistry, its applications in modern synthetic chemistry, and the contributions of the Nobel Prize-winning studies were discussed. The importance of simple, selective, and efficient reactions in modern chemistry and pharmaceutical research was emphasized. The event provided participants with a productive and inspiring experience in terms of following current scientific developments, listening to the scientific perspective of a leading figure in the field, and enhancing their academic outlook.

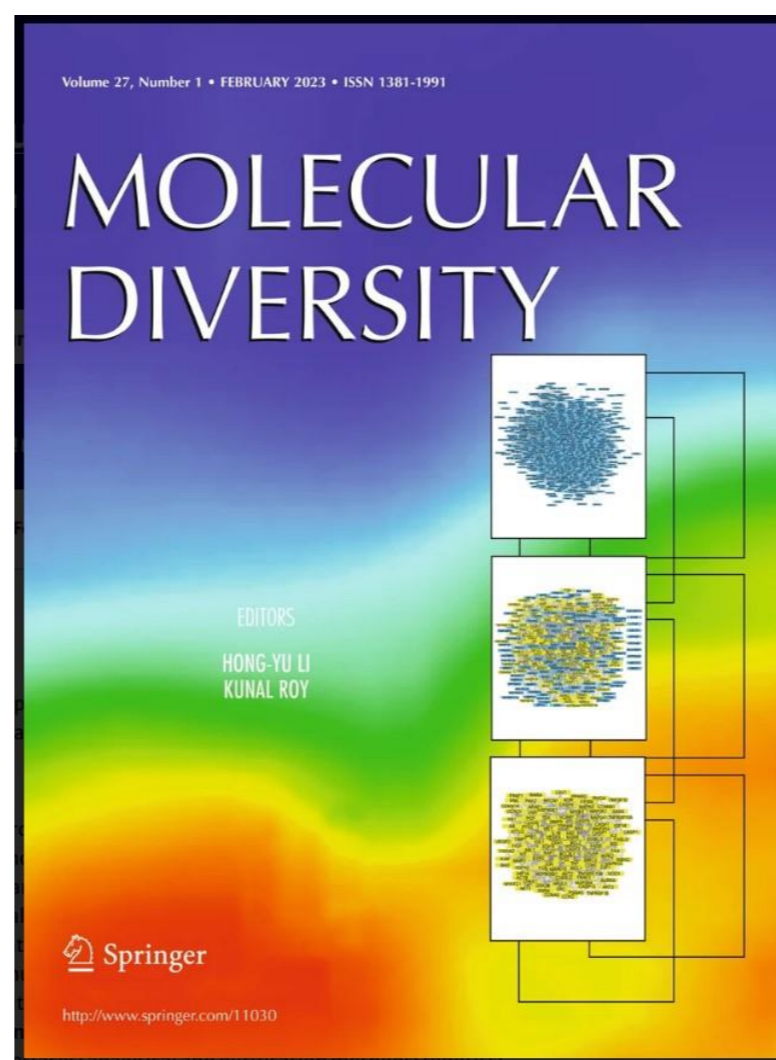




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A study authored by our Vice Dean and Department of Pharmaceutical Chemistry faculty member Prof. Dr. Sevgi Karakuş, titled “*Synthesis of New Sulfonamides from Sulfamethizole: In Vitro Antitubercular and Antimicrobial Activities Supported by Molecular Docking, Molecular Dynamics, and ADME Studies,*” has been published in the Q2-indexed journal Molecular Diversity.



Molecular Diversity
<https://doi.org/10.1007/s11030-026-11544-z>

RESEARCH

Synthesis of new sulfonamides from sulfamethizole: in vitro antitubercular and antimicrobial activities supported by molecular docking, molecular dynamics, and ADME studies

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Abstract

The alarming increase in antimicrobial resistance and the persistence of diseases such as tuberculosis have created an urgent demand for novel agents with broad-spectrum antimicrobial potential. In this study, eleven new hybrid molecules (1–11) bearing sulfamethizole and benzamide scaffolds were synthesized using a molecular hybridization strategy. Structural elucidation was carried out via IR, ¹H-NMR, ¹³C-NMR, mass spectrometry, and elemental analysis. The synthesized compounds were evaluated for their biological activity against a diverse panel of microorganisms, including Gram-positive and Gram-negative bacteria, dermatophyte group mold-type fungi, yeast strains, and *Mycobacterium* species. Biological screening results revealed that several of the compounds exhibited notable antimicrobial activity, with certain derivatives showing enhanced efficacy against mycobacterial and fungal pathogens. Among them, compound 1 drew interest with its remarkable antifungal activity against *Trichophyton rubrum* and *Microsporum gypseum* (0.008 mM MIC for both), while compound 8 emerged as a potent antitubercular lead with a notable MIC of 0.031 mM against *Mycobacterium intracellulare*. Besides, according to the molecular docking studies performed on CYP51 enzyme, it showed the most promising binding in this group with a -7.82 kcal/mol docking score, which is significantly better than the standard drug fluconazole (-5.40 kcal/mol) and comparable to the co-crystallized ligand VT1 (-9.36 kcal/mol), confirming its high binding affinity. Furthermore, 100 ns molecular dynamics simulations confirmed the structural stability of the enzyme-ligand complex through RMSD analysis, indicating a persistent binding mode. Complementary ADME predictions revealed that the compounds possess favorable pharmacokinetic properties and follow Lipinski's Rule of Five. These findings highlight the potential of sulfamethizole-based benzamides as promising candidates for antimicrobial drug development through a successful correlation between in vitro and in silico data.

Keywords Sulfonamide · Antitubercular · Antimicrobial · Molecular docking · Molecular dynamics · ADME

Introduction

Bacterial infections remain a significant global health challenge, accounting for millions of deaths each year. Although the discovery of antibiotics revolutionized modern medicine, the alarming rise in antibiotic-resistant bacterial strains has necessitated the search for new antimicrobial agents [1, 2]. Among infectious diseases, tuberculosis (TB) continues to be a major public health concern despite the availability of vaccines for over a century and the use of chemotherapeutic agents for more than seven decades. TB still contributes considerably to both morbidity and mortality worldwide [3].

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Leadership Story in the Pharmaceutical Industry: Ms. Vildan Kumrulu Met with Students at the “Difference Makers Academy”

Within the scope of the Istanbul Aydın University “Difference Makers Academy”, Vildan Kumrulu, Vice Chair of the Board of Polifarma Pharmaceuticals, met with students on April 14, 2026, at the Mor Hall of the T Block Social Sciences Campus. During the event, which was attended predominantly by Faculty of Pharmacy students, a talk titled “*Leadership Story in the Pharmaceutical Industry*” was delivered.

Ms. Kumrulu shared experiences from her professional career journey and addressed different dimensions of leadership in the pharmaceutical industry. She provided valuable insights into the path to success and emphasized the importance of listening to one’s inner voice, taking risks, and moving forward with determination in the face of challenges. The event was also attended by Ufuk Kumrulu, Başbuğ Öke, and members of the Polifarma team. The program concluded as a productive and inspiring gathering for the participants.





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SciVal Training Organized for Academic Staff

A SciVal training session was organized for the academic staff of the Faculty of Pharmacy with the contributions of İrem Kaya and Oğuzhan Sandıkçioğlu from the Istanbul Aydın University Library and Documentation Department.

The training was held at 14:00 in Classroom T Block 306. Within the scope of the program, academic staff members were informed about the use of SciVal, the analysis of research performance, and the evaluation of scientific outputs. Participants' questions were answered, and practical details regarding the platform were shared. In addition, academic staff members discussed the challenges they encountered while using SciVal, and the trainers provided suggestions and solutions to address these issues. As a result of the productive training session, it was decided to organize additional training programs tailored to the needs of the academic staff.

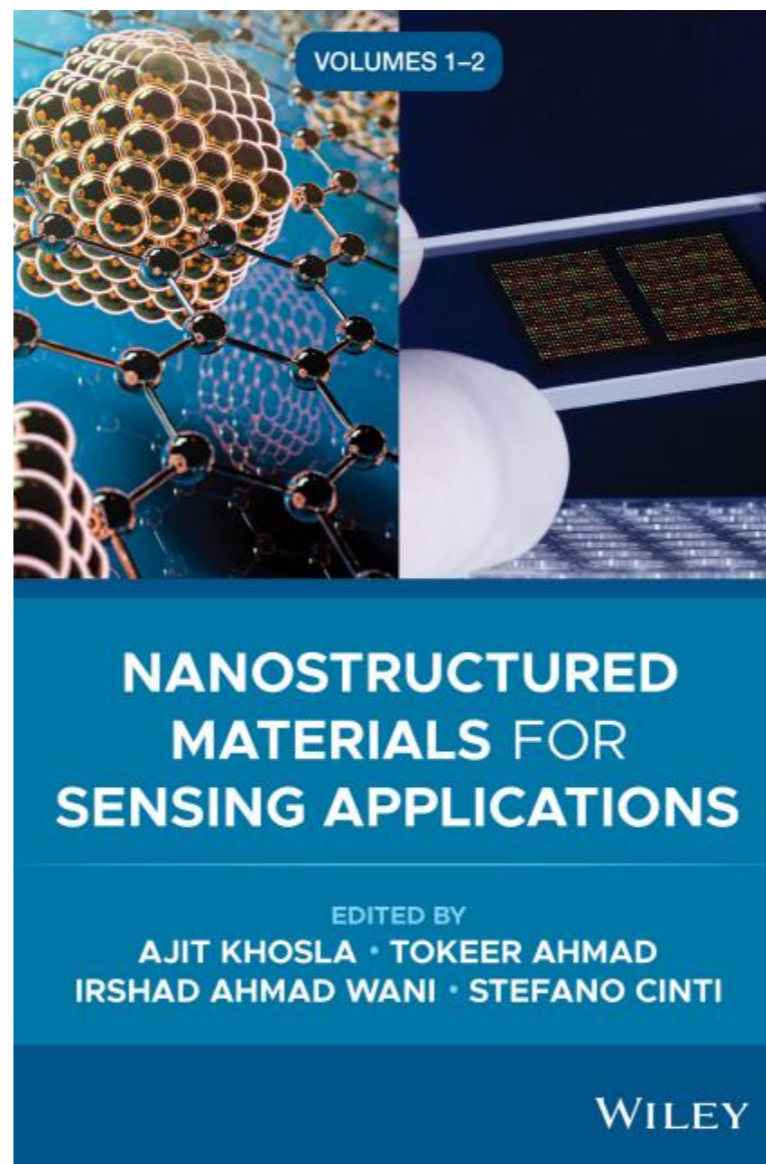




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Chapters authored by our Department of Analytical Chemistry faculty members Assist. Prof. Dr. Cem Erkmen and Assist. Prof. Dr. Zeynep Türk, titled “*Nanocomposites as Electrochemical Sensors*” and “*Magnetic Nanoparticles as Electrochemical Sensors*” have been published in the book *Nanostructured Materials for Sensing Applications: Nanostructured Materials for Advanced Sensing Platforms*.



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Magnetic Nanoparticles as Electrochemical Sensors

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11.1 Introduction

A sensor is broadly defined as a device that converts specific data into a measurable signal. Such devices typically consist of two fundamental components: a recognition element and a transducer. The recognition element interacts specifically with the target substance, triggering a response that is transformed into a quantifiable signal by the transducer. Recognition elements can vary widely, from functionalized surfaces to complex molecules designed to interact selectively with the target analyte. The transducer, in turn, converts the interaction event into a readable output, enabling the system to provide actionable information [1].

Sensors can generally be categorized based on their mode of operation, such as catalytic or affinity-based systems. Catalytic systems rely on chemical or biological activity to generate a signal, for example, through redox reactions or enzyme-mediated processes. In contrast, affinity-based systems depend on highly specific interactions, such as those seen in host-guest chemistry or molecular binding events. The detection process may involve a variety of signal monitoring methods, including optical, gravimetric, or electrochemical techniques, depending on the type of transducer used [2]. These methods allow for the translation of complex interaction events into meaningful, analyzable data for a wide range of applications.

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Nanocomposites as Electrochemical Sensors

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12.1 Introduction

The strategic combination of nanomaterials with a supporting matrix has led to the development of a novel class of advanced materials known as nanocomposites. These materials have profoundly transformed the landscape of electrochemical technologies, paving the way for groundbreaking applications in analytical sciences, biomedical engineering, and industrial monitoring (Figure 12.1a) [1, 4, 5]. Since the advent of nanotechnology in 1981, nanomaterials—ranging in size from 1 to 100 nm—have played a pivotal role in the rapid evolution of sensor technology (Figure 12.1b) [2, 6]. Therefore, their integration into nano/biosensor platforms has significantly enhanced sensitivity, stability, and analytical precision, leading to substantial advancements in various sensing applications (Figure 12.1c) [3].

Sensors have been extensively investigated for their crucial role in detecting and monitoring analytes across diverse fields, including food safety, environmental surveillance, clinical diagnostics, and pharmaceutical analysis [7]. Incorporating novel and advanced materials has further enhanced the selectivity of affinity-based sensors, addressing the evolving demands of modern analytical systems [8]. Today, sensors detect a wide range of biologically active compounds in complex biological matrices such as blood, serum, saliva, and urine [9]. Additionally, their applications address persistent challenges in pharmaceuticals, biomedicine, and tissue engineering [10].



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April

Industry Representative Met with Students Within the Scope of the Probiotics Course

Within the scope of the faculty elective course “ECF228 Probiotics,” coordinated by Assist. Prof. Dr. Merve Ataman, Hasan Alkım Yıldız, who serves as a Pharmacist and Jr. Product Manager at Nobel Pharmaceuticals, met with students on Wednesday, April 22, 2026, at 15:00 in Classroom M Block 9404.

During the event, Yıldız shared experiences from his student years, internship experiences, and career journey, providing students with valuable guidance for their professional development. Subsequently, the effects of probiotics on health, their current areas of use, and applications within the pharmaceutical industry were discussed. Through this meeting, which supported the course content, students had the opportunity to reinforce their theoretical knowledge with industry experience while also receiving answers to their questions regarding the field.





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The 10th Talk Program Was Held Within the Scope of the “Difference Makers Academy”

The 10th meeting of the Istanbul Aydın University “**Difference Makers Academy**”, chaired by our Dean Prof. Dr. Ayşe Nurten Özdemir, was held on April 28, 2026, at the Mor Hall of the T Block Social Sciences Campus. The event titled “*Digital Homeland and Responsible Publishing,*” moderated by Prof. Dr. Aybike Serttaş, featured Arzu Erdem as the guest speaker.

During the event, Erdem addressed the concept of the “digital homeland” by drawing attention to the responsibility of producing and sharing information in an increasingly digitalized world. She emphasized the importance of conscious digital usage and access to accurate information. In addition, she shared her experiences regarding work–life balance and time management. The event, which inspired young participants through examples from her own life, concluded as a productive meeting that raised awareness among attendees.





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We Participated in the Football Tournament Organized Within the Scope of Pharmacy Day on May 14

Within the scope of the May 14 Pharmacy Day events, students from our faculty participated in the astroturf football tournament organized by the Fenerbahçe University Faculty of Pharmacy and held at the Fenerbahçe Sports Club Spor Toto Fikirtepe Facilities on April 28, 29, and May 1, accompanied by Assist. Prof. Dr. Cem Erkmén.

During the tournament, matches were played against the Faculties of Pharmacy of Istanbul Medipol University, İstinye University, and Fenerbahçe University. Our students successfully represented our faculty through their performance, demonstrating team spirit, sportsmanship, and solidarity throughout the tournament. Reflecting the unifying power of sports, the organization contributed to the enthusiasm of Pharmacy Day while also increasing social interaction among our students.





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The Pharmacy Profession Was Introduced to High School Students Within the Scope of Cihangir Schools 10th Career Days

Within the scope of the 10th Career Days organized at the Cihangir Schools Bahçeşehir Campus on April 30, 2026, our Vice Dean Prof. Dr. Sevgi Karakuş and Assist. Prof. Dr. Gizem Sena Elagöz met with 9th–12th grade students.

During the event, information was provided about the pharmacy profession, pharmacy education, and career opportunities. In addition, common misconceptions regarding the use of medicines, dietary supplements, and cosmetic products were discussed. Particular attention was given to appearance-oriented incorrect practices among young people and the appropriate approaches to these issues. The program, carried out interactively with the contributions of biology teacher Aybüke Güngör, included a question-and-answer session with students and helped raise awareness regarding career planning and health literacy. The event concluded with a ceremony and plaque presentation held at the end of the day.

