Onur Burak Özdemir

onur.oezdemir@tum.de • Personal website • Google Scholar • Linkedin

Education

Technical University of Munich • Munich, Germany 10/2022 – 09/2025

Master of Science, Applied and Engineering Physics

Grade: 1.5/1.0 (passed with distinction)

Thesis: *Investigating Synthetic Protein Waves in Mammalian Cells with a View Toward Programmable Output Signals*

Supervisors: Prof. Friedrich Simmel, Prof. Gil G. Westmeyer

Relevant Coursework: Physics and Chemistry of Functional Interfaces · Mammalian Cell Engineering · Synthetic Biology · Super-Resolution Imaging of DNA Nanostructure

Istanbul Technical University • Istanbul, Turkey 10/2017 – 07/2022

Bachelor of Science, Engineering Physics

Grade: 3.5/4.0 (high honors)

Thesis 1: *Intelligent Control of Ozone Filters Using Reinforcement Learning*
Thesis 2: *In-vitro Optical Glucose Measurement Using Near-Infrared Light*

Supervisor: Prof. Ali Gelir

Relevant Coursework: Opto-Electronics · Quantum Mechanics · Optics · Computational Methods · Statistical Learning

Research Experience

Technical University of Munich • Master's Thesis Research 04/2024 – 04/2025

Lab of Physics of Synthetic Biosystems (Prof. Simmel) & Lab of Neurobiological Engineering (Prof. Westmeyer)

- Expressed MinD/MinE bacterial proteins in HEK293T cells and established tunable & optically visible intracellular protein oscillations by adjusting MinD:MinE ratios; observed intercellular synchronization.
- Built a napari-based Python pipeline (Cellpose, SAM, NumPy/SciPy/scikit-image, OpenCV; optical flow + FFT/Hilbert) for single-cell quantification.
- Engineered membrane-anchored transmembrane cargo; confirmed targeting but no robust MinDE-driven transport, leading to a next-gen design (larger intracellular domain/affinity-tuned variants).

Key Skills: Synthetic Biology · Mammalian Cell Engineering · Live-cell Imaging · Quantitative Image Analysis · Python · Signal Processing · Protein Design · Molecular Cloning & Transfection

Technical University of Munich • Research Assistant (part-time) 01/2024 – 04/2025

Lab of Physics of Synthetic Biosystems (Prof. Simmel) & Lab of Neurobiological Engineering (Prof. Westmeyer)

- Performed 4D AI-based segmentation of subcellular structures on large datasets using HPC resources.
- Conducted TEM and AFM imaging of DNA origami structures, analyzing datasets for characterization.
- Carried out DNA cloning, plasmid assembly, and transient gene expression in mammalian cells and bacteria.

Key Skills: Nanoscale Imaging (TEM/AFM) · 4D AI Image Analysis · Python · Molecular Cloning

Helmholtz Munich • Student Assistant (part-time) 03/2023 – 09/2023

Institute of Computational Biology (Prof. Fabian Theis)

- Prepared and structured biological datasets for analysis on HPC clusters.
- Contributed to documentation and maintenance of an existing computational biology library.

Key Skills: Data Preprocessing · HPC Workflows · Computational Biology Pipelines · Documentation

Istanbul Technical University • Undergraduate Researcher & Thesis Research 10/2017 – 07/2022

Gali Lab (Prof. Ali Gelir)

- Portable near-IR glucose device (BSc thesis): Designed the optics and electronics, tested multiple wavelengths to find the best non-invasive signal, and wrote the analysis code. The project led to a first-author paper.
- 3D optomechanical facial scanner: Built a scanner on a motorized arm as a team and developed separate software to analyze scars from the 3D scans.
- Energy devices: Fabricated and tested PVA-based binary-gel electrolytes and gel-electrolyte supercapacitors, and characterized their electrical performance.
- UVC mask: Designed and built a UVC-LED disinfection module for an antiviral face mask application.
- Forensic document analysis: Developed 3D scanning and image-processing methods to determine the order of intersecting strokes in questioned documents.
- Smart ozone filter (BSc thesis): Implemented reinforcement-learning control and validated it on a hardware prototype.

Key Skills: Optical Sensing · Device Prototyping · Materials Synthesis & Characterization · 3D Printing · 3D Scanning · Image Analysis · Data Acquisition & Control (Python/MATLAB)

Industry R&D Experience

Baykar Tech • Software Engineer 06/2022 – 08/2022

- Generated 3D geospatial reconstructions from aerial imagery using Neural Radiance Fields (NeRF).

Key Skills: 3D Reconstruction · Computer Vision · Neural Radiance Fields (NeRF) · Image Stitching

Scientific and Technological Research Council of Turkey (TUBITAK) • Research Intern 12/2021 – 07/2022

Materials Research Institute (MAM)

- Developed software for dark I–V characterization of space-qualified solar cells to monitor device performance.
- Fabricated OLED and photovoltaic devices and implemented I–V analysis tools for characterization.

Key Skills: Device Fabrication · I–V Characterization · Test Automation · Data Analysis

Selected Grants & Honors

- **Scientific Research Projects (BAP) Grant**, Istanbul Technical University, awarded for "In-vitro Optical Glucose Measurement Using Near-Infrared Light", completed as a BSc thesis and published as a first-author paper.
- **STAR-Intern Researcher Scholarship**, Scientific and Technological Research Council of Turkey (TUBITAK), selected fellow for undergraduate research at the Materials Research Institute (MAM), 2021–2022.
- **High Honor List (Dean's List)**, Istanbul Technical University

Qualification & Skills

Languages: English (C1, Toefl 110) · Turkish (native) · German (A2)

Technical Skills

- **Programming:** Python (NumPy, SciPy, PyTorch, scikit-image, OpenCV) · MATLAB · C++ · Fortran
- **Imaging & ML:** Napari · Cellpose · Segment Anything (SAM) · Optical Flow · FFT/Hilbert · 4D (3D+t) Analysis · 3D scanning & NeRF reconstruction
- **CAD & Visualization:** SolidWorks · Fusion 360 · AutoCAD · Blender · Technical Drawing ·BioRender
- **Electronics & EDA:** Arduino · PCB design with KiCad · Altium
- **Fabrication & Prototyping:** 3D printing (FDM, resin/SLA) · CNC milling

Teaching & Leadership

- **Volunteer Physics Instructor**, Ministry of Youth and Sports funded program, Summer 2021, designed and led hands-on optics/electronics labs for high-school students.

Publications

- **Özdemir, O. B**., Gelir, A., Özdemir, S., Kadi, O. F., Seyhan, S. N., & Yıldırım, K. B. (2023). *Comparing the light response of D-glucose in polyacrylamide hydrogel and water in the near-infrared using an LED-based portable device.* Optical and Quantum Electronics, 55(1), 30. https://doi.org/10.1007/s11082-022-04123-7.
- Öztürk, T. P., **Özdemir, O. B.**, Gelir, A., Keshtiban, N. A., Yargı, Ö., Pıravadılı Mucur, S., & Seçgin, A. (2024). *Effect of conductive layer on the performance of gel electrolyte-based supercapacitors*. Journal of Applied Polymer Science, 141(4), e54854. https://doi.org/10.1002/app.54854.
- Öztürk, T. P., Gelir, A., Keshtiban, N. A., Yargı, **Ö., Özdemir, O. B.**, Pıravadılı Mucur, S., & Seçgin, A. (2023). *Synthesis and characterization of PVA-based binary-gel electrolytes including massive ions.* Journal of Solid State Electrochemistry, 27, 885–894. https://doi.org/10.1007/s10008-023-05390-4.
- Gelir, A., Asıcıoğlu, F., Yılmaz, A. S., Kuskucu, M., Doymaz, M., **Özdemir, O. B.**, Sarıbal, D., Salman, S., Kadi, Ö. F., Özdemir, S., & Seyhan, S. N. (2023). *UVC-LED-based face mask design and efficacy against common germs.* Archives of Industrial Hygiene and Toxicology, 74(4), 282–287. https://doi.org/10.2478/aiht-2023-74-3766.
- Asıcıoğlu, F., Gelir, A., Şen Yılmaz, A., De Kinder, J., Kadi, O. F., **Özdemir, O. B.**, Pekacar, İ., Sasun, U., Çiftçi, S. B., & Dayıoğlu, N. (2024). *A 3D scanning-based image processing technique for measuring the sequence of intersecting lines*.International Journal on Document Analysis and Recognition (IJDAR), 28(1), 85–96. https://doi.org/10.1007/s10032-024-00495-6.