

Biomedical Technologies and Innovation Doctoral Programme (BIOTIN)



Title of the PhD Project	Design of novel sugar and lipid-based reactive polymeric materials for cellular targeting
Acronym	SUGLIPOL
Research Fields of the Project	Nanomedicine, Drug Delivery, Polymer synthesis, Organic synthesis, Pharmaceuticals, Cell biology
Keywords	Drug Delivery, Polymers, Click Chemistry, Nanomedicine, Biomaterials
Host Institution, Department and Campus Location	Boğaziçi University, Department of Chemistry, North Campus, Bebek, Istanbul
PhD Awarding Institution and Graduate Programme	Boğaziçi University, Institute of Biomedical Engineering, PhD in Biomedical Engineering
Name and Affiliation of Main Supervisor	Prof. Amitav Sanyal (BOUN)
Name and Affiliation of Co-supervisors	Prof. Cengizhan Öztürk (BOUN) Assoc. Prof. Özden Yalçın Özuysal (IZTECH)
Research Environment and Infrastructure	Boğaziçi University one of the top public universities in Turkey. It has excellent research facilities to conduct cutting-edge projects. The department has access to two 400 MHz NMR Spectrometer, FTIR Spectrometer, UV-Vis Spectrometer, Medium Pressure Flash Chromatography, Size Exclusion Chromatography (GPC), Fluorescence/Confocal Microscope, Transmission Electron Microscopy, Scanning Electron Microscopy. Easy, walk-in access to all these instruments to the researcher will make smooth execution of project and enable training (https://sanyalgroup.boun.edu.tr/).
Scientific Context of the Project	Polymeric and inorganic nanomaterials are at the forefront of advances in targeted drug delivery, and can address many of the health issues facing mankind. Nanosized delivery agents composed of judiciously chosen polymers either alone or in combination with an inorganic nanoparticle core can be engineered to selectively target the disease sites and deliver the cytotoxic agents selectively. Carbohydrates and lipids are basic building blocks of many of the functional biomolecules in our body. Their innate non-toxicity and selective interaction with cells inspire the design of drug delivery vehicles in this project. In particular, the project will involve design and synthesis of polymers containing sugar and lipid group to fabricate a variety of delivery platforms such as polymeric nanoparticles and nanogels. Polymers containing sugar and lipid building blocks will also be combined with magnetic nanoparticles to design theranostic agents.

Biomedical Technologies and Innovation Doctoral Programme (BIOTIN)



Brief Workplan	<ul style="list-style-type: none"> - Synthesis of novel copolymers using controlled polymerization techniques, - Nanoparticle/micelle formulations, - Drug delivery to various cancer cell lines for screening
Innovative Aspects of the Project	<p>Novel sugar and lipid containing polymeric materials will be developed to find the best carrier for targeted delivery of therapeutic agents to cancer cells. A modular synthetic approach to enable a plug-and-play drug delivery vehicles tailored for targeting different types of cancer will be established. Underlying aim is utilization of natural building blocks like sugars and lipids would afford a highly biocompatible carrier.</p>
Training Opportunities of the Project	<p>The student will be trained in the area of polymer synthesis, inorganic and polymeric nanoparticle synthesis, characterization of nanomaterials, drug delivery and <i>in vitro</i> biological evaluations. Project will train and prepare the student to work on interdisciplinary projects in drug delivery and diagnostics related areas of biomedical sciences.</p>
Interdisciplinary Aspects	<p>This highly multidisciplinary project involves basic organic chemistry, and polymer chemistry. It also involve fabrication of inorganic nanomaterials such as magnetic nanoparticles. Pharmaceutic technology will be involved in formulation of stable drug delivery platforms. Application part of project will involve cell biology, where update, toxicity and targeting ability of carriers will be evaluated.</p>
Intersectoral Mobility <input checked="" type="checkbox"/> Short Visit <input type="checkbox"/> Secondment	<p><i>Host: RS Research</i></p> <p><i>Context of Mobility: Training in pharmaceutical formulation</i></p>
Intersectoral Mobility <input checked="" type="checkbox"/> Short Visit <input type="checkbox"/> Secondment	<p><i>Host: Istanbul Health Industry Cluster (ISEK)</i></p> <p><i>Context of Mobility: Entrepreneurship Training, Thematic Pre-incubation Program</i></p>
International Academic Secondment	<p><i>Host Supervisor: Prof. Remzi Becer</i></p> <p><i>Host Institution: University of Warwick, Coventry, UK</i></p> <p><i>Host Department: Department of Chemistry</i></p> <p><i>Duration: 6 months</i></p> <p><i>Estimated Time of Mobility: 3 months each twice during PhD</i></p>

Biomedical Technologies and Innovation Doctoral Programme (BIOTIN)



Main Supervisor													
Brief CV	<p>Prof. Amitav Sanyal</p> <p>E-mail: amitav.sanyal@boun.edu.tr</p> <p>ACADEMIC DEGREES</p> <table><tr><td>Ph.D.</td><td>Chemistry</td><td>Boston University, USA</td><td>2009</td></tr><tr><td>M.Sc.</td><td>Chemistry</td><td>Indian Institute of Technology, USA</td><td>1994</td></tr></table> <p>Google Scholar: https://scholar.google.com.tr/citations?user=q5rblHkAAAAJ&hl=tr&oi=ao https://orcid.org/0000-0002-6966-0774</p>	Ph.D.	Chemistry	Boston University, USA	2009	M.Sc.	Chemistry	Indian Institute of Technology, USA	1994				
Ph.D.	Chemistry	Boston University, USA	2009										
M.Sc.	Chemistry	Indian Institute of Technology, USA	1994										
Co-supervisors													
Brief CV	<p>Prof. Cengizhan Öztürk</p> <p>E-mail: cozturk@boun.edu.tr</p> <p>ACADEMIC DEGREES</p> <table><tr><td>Ph.D.</td><td>Biomedical Engineering</td><td>Drexel University, USA</td><td>1997</td></tr><tr><td>Spec.</td><td>Physiology</td><td>Istanbul University, Cerrahpaşa Medical Faculty</td><td>1994</td></tr><tr><td>M.D.</td><td>Medicine</td><td>Marmara University, Turkey</td><td>1990</td></tr></table> <p>Google Scholar: https://scholar.google.com/citations?user=ldHoVggAAAAJ&hl=tr&oi=ao https://orcid.org/0000-0002-6966-0774</p>	Ph.D.	Biomedical Engineering	Drexel University, USA	1997	Spec.	Physiology	Istanbul University, Cerrahpaşa Medical Faculty	1994	M.D.	Medicine	Marmara University, Turkey	1990
Ph.D.	Biomedical Engineering	Drexel University, USA	1997										
Spec.	Physiology	Istanbul University, Cerrahpaşa Medical Faculty	1994										
M.D.	Medicine	Marmara University, Turkey	1990										
Brief CV	<p>Assoc. Prof. Özden Yalçın Özuysal</p> <p>E-mail: ozdenyalcin@iyte.edu.tr</p> <p>ACADEMIC DEGREES</p> <table><tr><td>Ph.D.</td><td>Life Sciences</td><td>University of Lausanne, Switzerland</td><td>2009</td></tr><tr><td>M.Sc.</td><td>Molecular Biology and Genetics</td><td>Bilkent University, Turkey</td><td>2004</td></tr><tr><td>B.Sc.</td><td>Molecular Biology and Genetics</td><td>Bilkent University, Turkey</td><td>2002</td></tr></table> <p>Google Scholar: https://scholar.google.com/citations?user=sANbUOgAAAAJ&hl=tr&oi=en https://orcid.org/0000-0003-0552-368X</p>	Ph.D.	Life Sciences	University of Lausanne, Switzerland	2009	M.Sc.	Molecular Biology and Genetics	Bilkent University, Turkey	2004	B.Sc.	Molecular Biology and Genetics	Bilkent University, Turkey	2002
Ph.D.	Life Sciences	University of Lausanne, Switzerland	2009										
M.Sc.	Molecular Biology and Genetics	Bilkent University, Turkey	2004										
B.Sc.	Molecular Biology and Genetics	Bilkent University, Turkey	2002										