

# Biomaterials for Biomedical Applications

**Lihl Adler-Abramovich**

*Department of Oral Biology, The Goldschleger School of Dental Medicine, Sackler Faculty of Medicine, The Center for Nanoscience and Nanotechnology, Tel Aviv University, Tel Aviv 69978, Israel, [LihlA@tauex.tau.ac.il](mailto:LihlA@tauex.tau.ac.il), [www.lihiadler.sites.tau.ac.il](http://www.lihiadler.sites.tau.ac.il)*

## Abstract

The increasing demand for minimally invasive bone regeneration strategies drives the development of innovative biomaterials. Molecular self-assembly, a focal point in current nanotechnology and material science, presents a promising avenue. By co-assembling hydrogel-forming peptides with polysaccharides and bone ceramics, we create multi-component hydrogels that mimic the bone extracellular matrix. Injectable and biodegradable, these hydrogel scaffolds are designed for bone defect reconstruction, showcasing excellent biocompatibility and osteogenic differentiation potential. Moreover, we employ hydrogels with a high storage modulus to promote osteogenic differentiation and facilitate bone deposition in vivo. Notably, implantation of these hydrogels leads to significant bone restoration, inducing bone deposition around margins and generating bony islets along defects through an immunomodulation mechanism.

Additionally, our research extends to the development of unique soft materials for 3D printing custom-made scaffolds with desired mechanical and biological properties. By incorporating ethylene glycol motifs into the peptide, we enhance hydrogel elasticity and viscosity, crucial for 3D printing, thereby eliminating the need for post-printing crosslinking processes. This comprehensive approach underscores the potential of molecular self-assembly and 3D printing techniques in fabricating biomimetic scaffolds for bone regeneration, thereby advancing personalized tissue engineering applications.

## Short Biography

Prof. Lihl Adler-Abramovich is a Professor at the School of Dental Medicine, Faculty of Medicine. She is a principal investigator and the head of the Laboratory of Bioinspired Materials and Nanotechnology. Prof. Adler-Abramovich studied biology at Tel Aviv University, where she received both her M.Sc. (summa cum laude) and her Ph.D. (2010). Recognized with prestigious grants and prizes, including the ERC Starting Grant, ERC-PoC, and ISF-Center for Excellence Grant, Lihl Adler-Abramovich's research has been published in over 100 publications, including esteemed journals like ACS Nano, Nature Nanotechnology, and Nano Letters, with an impressive H-index of 44. Lihl develops new materials inspired by biological processes and leverages them for medical and biotechnological applications. Additionally, she holds over 20 patents and has co-founded Arrakis Bio LTD, a startup focusing on producing animal-free collagen for cultivated meat and medical applications.

