

# Biomedical Engineering

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## Core Faculty Profile

### Igal Szleifer

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Igal Szleifer

## Research Interests

The focus of our research is in the molecular modeling of biointerphases. Our work is aimed at the fundamental understanding of the properties of complex molecular systems that encompass problems at the interface between medicine, biology, chemistry, physics and materials science. Our group concentrates on the development and application of theoretical approaches that enable the study of the systems of interest at the molecular level. The results of these studies are then used in the design of optimal materials that interact with biological environments. Most of our projects are carried out in close collaboration with experimental collaborators. Our theoretical work has the dual purpose of: 1) the fundamental understanding of what are the molecular factors that determine the properties and behavior of the interactions between biological environments and synthetic systems, and 2) the ability to predict in a quantitative way experimental systems in order to use the theoretical approaches as a device tool for the engineer of new materials, such as biocompatible materials and drug carriers.

Specific systems of interest include: protein adsorption and biocompatible materials, lipid layers and model cell membranes, drug delivery systems, ligand-receptor binding and smart (reponsive) materials.

## Education

B.Sc., 1984, Ph.D., 1989, Hebrew University of Jerusalem, Israel; Postdoctoral Associate, 1988-1991, Cornell University.

## Recognitions

- Raices-Cesar Milstein Fellowship , 2007
- Akron Section ACS Award , 2005
- Fellow of the American Physical Society, 2005
- University Faculty Scholar, 2004-2009
- Camille Dreyfus Teacher-Scholar Award, 1997
- NSF Career Award, 1996
- Camille and Henry Dreyfus New Faculty Award, 1991
- Wolf Foundation Award for Ph.D. Candidates, 1985-1986
- Farkash Award, Department of Chemistry, Hebrew University, 1984

## Selected Publications

1. "Controlled Release of Proteins from Polymer Modified Surfaces", Fang Fang and I. Szleifer, Proc. Nat. Acad. Sci. 103, 5769-5774 (2006).
2. "Phase diagram of a ternary mixture of cholesterol and saturated and unsaturated lipids calculated from a microscopic model", R. Elliott, I. Szleifer, M. Schick, Phys. Rev. Lett. 96, 098101 (1-4), (2006).
3. "Phase behavior and charge regulation of weak polyelectrolyte grafted layers", Peng Gong, Jan Genzer and I. Szleifer, Phys. Rev. Lett. 98, 018302(1-4) (2007).
4. "Effects of block copolymer's architecture on its association with lipid membranes: Experiments and simulations", Shelli L. Frey, Dongsheng Zhang, Marcelo A. Carignano, Igal Szleifer and Ka Yee C. Lee, J. Chem. Phys., 127, 114904 (12 pages) (2007).
5. "Stability and phase separation in mixed monopolar lipid:bolalipid layers", Gabriel S. Longo, David H. Thompson and I. Szleifer, Biophys. J., (in press).



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