

Gels in Biomedicine: Controlling Structure to Improve Performance

Dror Seliktar, Ph.D.

Faculty of Biomedical Engineering,
Technion – Israel Institute of Technology

Abstract

In the near future, hydrogels are expected to play a much greater role in biomedicine, changing the way we approach issues in stem cell research, cancer biology, drug discovery, tissue engineering and biotechnology. The development of improved methods to synthesize cell-compatible hydrogels to accommodate this trend depends on a thorough understanding of the design possibilities and the limitations. While biological systems provide an exceptional source of design inspiration for creating cell-compatible materials, man-made water-soluble polymers and polymer chemistry have contributed to the establishment of better control over the properties and reliability of the polymeric macromolecules, and subsequently, better control over the properties of the materials they form. Controlling the nano, micro and macro scale architecture of hydrogels has proven particularly effective in regulating cell response at the material-tissue interface. This presentation covers a few of the advanced design principles currently being applied to engineer cell-compatible biomedical hydrogels, with specific focus on how sophisticated new materials systems may lead the way to new discoveries in basic science, clinical medicine and biotechnology.