

Polymers in Medicine

Course Taught

3 units

Prof. Hamid Mirzadeh
Amirkabir University of Technology (Tehran Polytechnic)
Department of Polymer Engineering

Email: Mirzadeh@aut.ac.ir

[http://polymer.aut.ac.ir/autcms/res/upload/polymer-engineering/mirzadeh/HM\[16\].pdf](http://polymer.aut.ac.ir/autcms/res/upload/polymer-engineering/mirzadeh/HM[16].pdf)

Introduction

Biocompatibility issues:

-FDA, ISO10993 Standards

-*In Vitro* and *In Vivo* Assays

-Cell Polymeric Biomaterials Interactions

-Blood Polymeric Biomaterials Interactions

-Tissue Polymeric Biomaterials Interactions

1-Biodegradable Polymers as Scaffolds in Tissue Engineering:

-Polyesters (PGA, PLA, PLGA, PDO, PCL, PHB, PTA, PPF, PAH, POE)

-Polyurethanes

- Polyphosphazenes

-Poly(anhydrides)

-Poly(ortho esters)

-Poly(amides)

-Polycarbonates

2 - Kinetic and Biodegradation Mechanism of Biodegradable Polymers:

3-Natural Polymers as Scaffolds in Tissue Engineering:

- Chitin and Chitosan

-Hyaluronic acid

-Alginic Acid

-Collagen

-Gelatin

- Polysaccharides (cellulose)

4- Polymers in Targeting Therapy

5-Methods for Biodegradable Scaffolds Fabrications:

-Solvent Casting

-Solvent Casting/Particulate Leaching

-Gas Foaming

-Freeze Drying

-CAD

- Perforation method

-Electrospinning

-3D Printing

-FDM

6-Polymers in Drug Delivery Systems

7-Bioadhesive Polymers

8-Polymer in Skin, Bone, Tendon, and Cartilage Regeneration

9-Blood Compatible Polymers

10-Polymers in Cardiovascular Systems

11- Surface Modification and characterization of Polymers

12- Sterilization Methods

References:

-Annual Review of Biomedical Engineering Biomaterials: Been There, Done That, and Evolving into the Future Buddy D. Ratner Departments of Bioengineering and Chemical Engineering, University of Washington, Seattle, Washington 98195, USA, June, 2019.

-An Introduction to Materials in Medicine
Third edition 2013

Edited by

Buddy D. Ratner, Ph.D.

*Professor, Bioengineering and Chemical Engineering,
Director of University of Washington Engineered Biomaterials (UWEB),
University of Washington, Seattle, WA, USA*

Allan S. Hoffman, Sc.D.

*Professor of Bioengineering and Chemical Engineering,
UWEB Investigator, University of Washington, Seattle, WA, USA*

Frederick J. Schoen, M.D., Ph.D.

*Professor of Pathology and Health Sciences and Technology (HST),
Harvard Medical School; Executive Vice Chairman,
Department of Pathology, Brigham and Women's Hospital;
Boston, MA, USA*

Jack E. Lemons, Ph.D.

*University Professor, Schools of Dentistry, Medicine and Engineering,
University of Alabama at Birmingham, Birmingham, AL, USA*

Academic Press is an imprint of Elsevier

The Boulevard, Langford Lane, Kidlington, Oxford, OX5 1GB, UK

225 Wyman Street, Waltham, MA 02451, USA

Principles of Tissue Engineering, 3rd Edition

Edited by: Lanza, Langer, and Vacanti

Elsevier, Inc.2007.

All rights reserved

-Biomaterial Surfaces:

Properties and Characterization

J.A. Hubbell, M. Heuberger,

J. Vörös, M. Textor

ETH Zürich / Department Materials

Lecturers WS 2002/2003

- Biomaterials an introduction, J.B.Park, AP. 1992.

- Journals:
- JBMR
- Biomaterials
- Progress in Biomaterials
- Etc.