

Introduction to Biomaterials - Video course

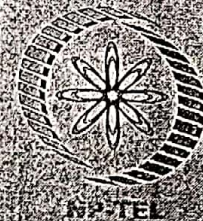
COURSE OUTLINE

Introduction to basic concepts of Materials Science; Salient properties of important material classes; Property requirement of biomaterials; Concept of biocompatibility; Structure and properties of biological cells & tissues; cell-material interactions and foreign body response; Assessment of biocompatibility of biomaterials, in vitro biochemical assays (cellular adhesion, cellular viability using MTT, osteogenic differentiation using ALP assay; Biomnunalisation using Osteocalcin assay);

In vivo testing and histocompatibility assessment; genotoxicity assessment (Physical damage to DNA by biomaterial eluates); important biometallic alloys: Ti-based, stainless steels, Co-Cr-Mo alloys; Bioinert, Bioactive and bioresorbable ceramics; Processing and properties of different bioceramic materials with emphasize on hydroxyapatite; synthesis of biocompatible coatings on structural implant materials; plasma spraying of carbon nanotube reinforced hydroxyapatite on Ti-6Al-4V substrate; Microstructure and properties of glass-ceramics; biodegradable polymers; Design concept of developing new materials for bio-implant applications.

COURSE DETAIL

Sl. No	Topic	Lecture Numbers
1.	Introduction to basic concepts of Materials Science; Salient properties of important material classes	1-3
2.	Property requirement of biomaterials; Concept of biocompatibility	4-5
3.	Structure and properties of biological cells & tissues	6-7
4.	Cell-material interactions and foreign body response	8-10
5.	Assessment of biocompatibility of biomaterials	11
6.	In vitro biochemical assays (cellular adhesion, cellular viability using MTT, osteogenic differentiation using ALP assay; Biomnunalisation using Osteocalcin assay)	12-15
7.	In vivo testing and histocompatibility assessment	16-17
8.	Genotoxicity assessment (Physical damage to DNA by biomaterial eluates)	18



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Metallurgy and Material Science

Additional Reading:

1. Biomaterials Science and Biocompatibility, Fredrick H. Silver and David L. Christensen, Piscataway, Springer, New Jersey
2. Biological Performance of Materials: Fundamentals of Biocompatibility, Jonathan Black, Marcel Dekker, Inc., New York and Basel, 1981
3. Basic Cell Culture: A Practical Approach, Edited by J.M. Davis, IRL Press, Oxford University Press, New York, 1994

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