



OPIS PREDMETA / SUBJECT SPECIFICATION

Predmet:	BIOLOŠKO AKTIVNI ORIENTIRANI POLIMERI
Subject Title:	BIOACTIVE ORIENTED POLYMERS

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Biomedicinska tehnologija Biomedical technology		2	3 ali 4

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Lab. work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
15	30				105	5

Nosilec predmeta / Lecturer:

Prof. dr. Karin STANA-KLEINSCHKEK,
Prof. dr. Simona STRNAD

Jeziki /

Languages:

Predavanja / Lecture: Slovenščina

Vaje / Tutorial: Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Kandidat mora doseči 300 ECTS na predhodnem študiju.

Prerequisites:

Graduate degree 300 ECTS

Vsebina:

- definicija pojmov: biološka aktivnost, biološka kompatibilnost, biološka razgradljivost, itd.
- vlaknati material v medicini: 1. uporaba na površini kože in tkiv (obliži, kirurške maske, halje in pregrinjala, plenice, tamponi, itd.). 2. uporaba znotraj tkiv - vstavki in vsadki (žile, vezi, mrežice, itd.). 3. uporaba v medicinskih napravah (dializni filtri, sodne, itd.)
- orientirani polimeri, uporabni v medicini (PLA, PET, PTFE, PU, PEG, celuloza, hitozan, idr.)
- reagenti, postopki in tehnologije za doseg biološko aktivnih lastnosti orientiranih polimerov (postopki priprave površin: s plazmo, z radiacijo, kemično modifikacijo, itd. ter postopki nanosa aktivnih snovi (PEO, PEG, hitozan, kolagen, heparin, alignat, itd.) s prašenjem, potapljanjem, premazovanjem, idr.)
- funkcionalne lastnosti orientiranih polimerov v medicini (visoka oz. specifična adsorpcijska kapaciteta, protimikrobna, specifične mehanske lastnosti, prepustnost, kontrolirano oddajanje substanc, protialergijsko delovanje, itd.)
- fizikalno kemijske metode za analizo biološko aktivnih površin orientiranih

Contents (Syllabus outline):

- definitions of concepts: bioactivity, biocompatibility, biodegradability, etc.
- Fibrous materials in medicine: 1. external - applicable on the skin or on tissue surface (surgical masks, smocks and aprons, tampons, diapers, wound dressings), 2. internal - applicable within tissues - implants and inserts (vascular grafts, ligaments, meshes, etc.) 3. their use in medical apparatuses (dialysis filters, probes)
- Oriented polymers applicable in medicine (PLA, PET, PTFE, PU, PEG, cellulose, chitosan, etc.)
- Reagents, processes and technologies for bioactive properties achievement of oriented polymers (the preparation of surfaces: using plasma, radiation, chemical modification, etc., as well as the application of active materials (PLA, PET, PTFE, PU, PEG,...) by spraying, dipping, painting, etc.)
- Functional properties of oriented polymers in medicine (a high, or rather specific adsorption capacity, antimicrobial qualities, specific mechanical properties, permeability, the controlled delivery of substances, antiallergic properties, etc.)
- Physical-chemical methods of analysis of

polimerov (morfologija in kemijska struktura površine, poroznost, prepustnost, hidrofilno/hidrofobni značaj, elektrokinetične lastnosti, površinski naboj, ...) - analize metode za ugotavljanje biološke kompatibilnosti orientiranih polimerov: 1. »in vitro«: v stiku s tkivom (rast celic, razvoj tkiv) oz. s krvjo in biološkimi tekočinami (statičnimi in dinamičnimi testi); 2. »in vivo« (funkcionalni in nefunkcionalni testi na živalih in ljudeh).	bioactive oriented polymer surfaces (the morphology and chemical structure of the surfaces, porosity, permeability, hydrophilic/hydrophobic character, electrokinetic properties, surface charge, surface free energy, ...) - Methods of analysis to the biocompatibility of oriented polymers: 1. in vitro: in contact with the tissue (cell growth, tissue development) or contact with blood and biological fluids (static and dynamic tests); 2. in vivo (functional and non-functional tests on humans and animals)
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Temeljni študijski viri / Textbooks:

- J. V. Edwards, T. L. Vigo, Bioactive fibres and Polymers, American Chemical Society, Washington, DC, 2001 - M. Szycher, High performance Biomaterials, A comprehensive guide to medical and pharmaceutical applications, Technomic Publishing Company Inc., 1991, Lancaster, USA - J. Black, Biological Performance of materials, Marcel Dekker, Inc., New York, 1999 - K. Park, Controlled Drug Delivery. Challenges and Strategies, ACS professional reference book, 1997, Washington DC - J. Richard, M. S. LaPorte, Hydrophilic Polymer Coatings for Medical Devices, Technomic Publishing Company Inc., 1997 - J. I. Gallin, I. M. Goldstein, R. Snyderman, Inflammation, Basic Principles and Clinical Correlates, Raven Press New York, 1992 - Sharma R.: Surfactant Adsorption and Surface Solubilization, Washington DC: American Chemical Society, 1995. - Parfitt G. D.: Adsorption from Solution at the Solid/Liquid Interface; London: Academic Press, 1983 - Ruthven, D. M.: Principles of adsorption and adsorption processes; New York (etc): John Wiley & sons, 1984 - Lyklema J.: Fundamentals of Interface and Colloid Science, Vol. 1: Fundamentals, London (etc.): Academic Press, 1993 - Kithara A., Watanabe A.: Electrical Phenomena at Interfaces; New York, Basel: Marcel Dekker inc., 1984 - Drew, M.: Surfaces, Interfaces and Colloids, Second Edition; New York (etc.): John Wiley & Sons, 1999
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Cilji:

- osvojitev pojmov s področja bioloških lastnosti orientiranih polimerov - osvojitev znanj s področja izdelave in obdelave materialov (tehnologije in postopki za pridobitev biološko aktivnih lastnosti) - poznavanje funkcionalnih lastnosti vlaknatih materialov, uporabnih v medicini - osvojitev teoretičnih osnov o fizikalno kemijskih metodah za analizo površinskih lastnosti orientiranih polimerov - seznanitev z metodami za ugotavljanje specifičnih lastnosti biološko aktivnih orientiranih polimerov
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Predvideni študijski rezultati:

Znanje in razumevanje: Študent bo dobil specialna znanja o bioloških in funkcionalnih lastnostih vlaknatih materialov, pa tudi o postopkih in tehnologijah pridobivanja biološko aktivnih lastnosti	Objectives: - mastering the concepts in the field of the biological qualities of oriented polymers - mastering knowledge in the area of producing and processing of materials (technology and procedures for achieving bioactive qualities) - gaining and understanding of the functional qualities of fibrous materials applicable in medicine - mastering the theoretical basis of physical chemistry methods of analyzing the surface qualities of oriented polymers - familiarity with methods used to determine the specific properties of bioactive oriented polymers Intended learning outcomes: Knowledge and Understanding: Student will get special knowledge about biological and functional characteristics of fibrous materials, about procedures and technologies of production biologically active characteristics
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Prenesljive/ključne spretnosti in drugi atributi: Študent bo osvojil fizikalno kemijske metode za analizo biološko aktivnih površin orientiranih polimerov	Transferable/Key Skills and other attributes: Student will occupy physical-chemical methods for analysis of biologically active surface of oriented polymers
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Metode poučevanja in učenja:

Learning and teaching methods:

Predavanja, individualno raziskovalno delo

Lectures, independent research

Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

Način (pisni izpit, ustno izpraševanje, naloge, projekt)

Type (examination, oral, coursework, project):

Ustno izpraševanje, seminarska naloga

Oral examination, report

Materialni pogoji za izvedbo predmeta :

Predavanja in individualno raziskovalno delo se bo izvajalo v obstoječih prostorih in na obstoječi opremi

Material conditions for subject realization

The lectures and individual research work will take place in the existing facilities using existing equipment.

Obveznosti študentov:

(pisni, ustni izpit, naloge, projekti)

Ustni izpit, seminarska naloga

Students' commitments:

(written, oral examination, coursework, projects):

Oral final exam, report