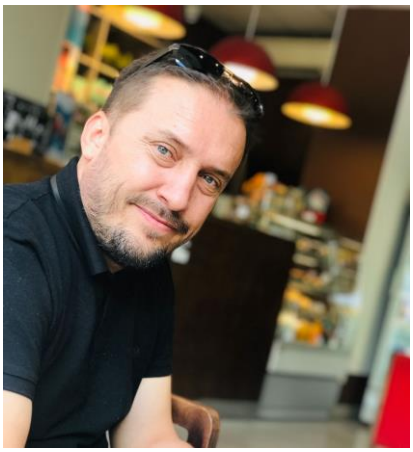
B I O L O Š K I O D S J E K , P M F

H R V A T S K O E K O L O Š K O D R U Š T V O

POZIV

Osobito nam je zadovoljstvo pozvati Vas u utorak, 25.04.2023. u **14:00** sati, u **predavaonicu P2 (Kraš) Biološkog odsjeka**, Zagreb, na četiri predavanja kolega sa Sveučilištu u Aksaray u Turskoj sljedećih naslova:

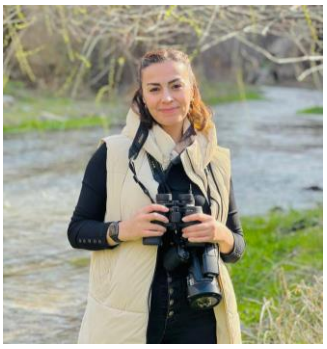


Prof. Dr. Yavuz Selim ÇAKMAK
Department of Molecular Biology and Genetics, Faculty of Science and Arts

Protein based biomaterials

Natural biomaterials are obtained from plant or animal tissues. The use of natural biomaterials is not a new concept; naturally derived materials have been used by humans for thousands of years. Naturally derived biomaterials have been demonstrated to show several advantages compared to synthetic biomaterials. These are biocompatibility, biodegradability and remodeling. Therefore, these biomaterials are usually applied in the repair or replacement of damaged human tissues and organs. The aim of this lecture is to provide a brief knowledge of naturally derived biomaterials as well as methods of preparation and application of them. Naturally derived biomaterial can be classified into many groups including protein-based biomaterials (collagen, keratin, gelatin, silk etc.), polysaccharide-based biomaterials (cellulose, chitin/chitosan, starch etc.) and decellularized tissue-derived biomaterials (decellularized heart valves, blood vessels, liver etc.). Biomaterials have ability to adequately support cell adhesion, migration, proliferation and differentiation. In particular, when implanted into a defective area, naturally derived biomaterials can enhance the attachment and migration of cells from the surrounding environment, therefore, induce extracellular matrix formation and promote tissue repair. Some biomaterials are used to acting as drug delivery system and medical devices such as surgical sutures. Furthermore, some biomaterials are used to produce environmental friendliness of packaging (such as resorbable chitosan packing) and other products.

Yavuz Selim ÇAKMAK is a Professor at Aksaray University. He graduated bachelor from the Department of Biology at Cumhuriyet University, Turkey in 2004. He obtained his M.Sc (2007) and Ph.D. (2011) degrees in Biology at Selcuk University, Konya. His research interests are mainly in fatty acids, medicinal plants, plant biochemistry, biotechnology and for last 10 years on biomaterial development and their chemical-biological characterizations. Especially recently he focus on protein based biomaterials and their biochemical properties.



Asist. Prof. Dr. Emel Çakmak
Department of Plant and Animal Production,
Güzelyurt Vocational School

Keratin as a protein based biomaterial

Goose feathers, a by-product of the poultry industry and used only sparingly, is the most abundant and renewable keratin biomass in the world. Today, goose down is considered a waste product in the poultry industry because their use is economically low and their destruction by burning or burial causes environmental problems. There are increasing interest in protein-based biomaterials. However, most of the commercially available materials used in these fields are formed synthetically from petroleum-based plastics or by combining natural biopolymers with crosslinking agents. However, materials derived from feathers can be used advantageously for many applications due to their unique properties like intrinsic biological activity and biocompatibility, which has led to the development of keratin biomaterials. Herein, we will report some newly formed keratin films could be a good alternative to the synthetic films due to their potential for being environmentally safe, non-toxic and sustainable. These studies includes the purification of keratin from poultry feathers, keratin film production and the determination of the biological (antioxidant activities) and chemical characterizations (FTIR spectroscopy, TGA and SEM). As a result of these analysis, the keratin could be suggested to be alternative source for new products from feathers in terms of obtaining both economical and environmentally friendly products by expanding their use in areas such as regenerative medicine, burn treatment and wound healing.

Emel Çakmak is an assistant professor at Aksaray University. She obtained her M.S (2012) and Ph.D. (2018) degrees in Biological Sciences at Middle East Technical University, Ankara. Her research interests covers conservation biology, molecular ecology, population genetics, ornithology and newly protein based biomaterials. She worked as a visiting researcher at Lund University (2017). Currently, she continues to study the population biology of salamanders from Turkey and the properties of keratin-based biomaterials in different projects.

Dr. Bektaş Ayık
Department of Park and Garden Plants, Aksaray Technical Sciences Vocation School

Chitosan-based biodegradable fertilizers

One of the most important inputs in agricultural production is fertilizers. Adequate use of fertilizers causes a serious increase in yield, while insufficient and incorrect use causes significant losses. Excessive use of nitrogen fertilizers also causes pollution of groundwater and surface waters and air pollution. While the use of agrochemicals causes negative effects on the environment, nitrate can cause serious health problems such as physiological diseases and cancer on living things. In order to limit these undesirable effects, controlled release technology has been introduced in agricultural applications. Controlled release fertilizers are in the form of a coating of conventional fertilizers. Polymers such as polyethylene, polystyrene, polyacrylamide and polysulfone provide continuous release of fertilizer over time. Commercial controlled-release fertilizers are not biodegradable. For this reason, coating materials are a source of pollution for soils. Fertilizers; Its inclusion in materials obtained with biodegradable polymers such as chitosan can be a promising approach to increase productivity in agriculture and reduce the use of agrochemicals. This new structure formed by the deacidification of chitin dissolves in aqueous acidic medium and this new structure is called chitosan. With its biodegradability, biocompatibility, edibility, high antioxidant and antimicrobial activity, and non-toxicity, chitosan has a wide range of applications. Studies will reveal the potential of chitosan-based biodegradable materials to be used in agriculture by examining their properties by producing and characterizing them. The studies carried out are very important in terms of the development of new products, the sustainable environment and the use of natural resources.

Bektaş AYIK is a lecturer at Aksaray University. He graduated from the Department of Plant Protection at Selcuk University, Turkey in 2011. He obtained his M.S (2014) degrees in Entomology at Selçuk University and Ph.D. (2022) degrees in Biotechnology and Molecular Biology at Aksaray University. His research interests are mainly in materials science, chitosan, cellulose and biomaterials that can be used in agriculture field.

Res. Asst. Behlül Koç Bilican
Department of Molecular Biology and Genetics,
Faculty of Science and Letter

Synthetically produced chitosan films are real chitosan or not?

Chitosan, which is obtained via deacetylation of chitin, has a variety of uses in agriculture, food, medicine, pharmaceuticals, and cosmetics. Industrial chitosan is in a gel form, which is produced by dissolving in acetic acids. These gels can be chitosan-only films or composite films that include other ingredients such as plant extracts or other polymers. Chitosan-based films, however, are not as natural as chitosan dissolved in weak acids, and they lack some of the chitosan's innate properties. To test this hypothesis, natural chitosan films were obtained from the pupa shells of black soldier flies through a process that maintains the original structure. The semisynthetic film was then produced by dissolving the same natural chitosan film in acetic acid along with glycerol and glutaraldehyde. The semisynthetic film remarkably lost the beneficial properties of the natural film. The deteriorated characteristics include hydrophobicity, crystallinity, thermal properties, as well as a loss of fibril structure and a reduction in bacterial attachment.

Behlül Koç Bilican graduated from the Department of Molecular Biology and Genetics at Cumhuriyet University, Turkey in 2015. After obtaining an MSc in Biotechnology and Molecular Biology from Aksaray University in 2018. Then she began PhD at the same institution in the same year. She is also research assistant at Aksaray University. Her research interest covers mainly biological perspective to material science; chitosan and mucilage based edible films; chitosan, cellulose, and protein based biomaterials.