

Annotation of Doctoral Thesis Topics for Degree Programme Biomaterials and Biocomposites

Topic:	Hydrogel wound dressings
Tutor:	doc. Ing. Zdenka Víchová, Ph.D.
Consultant:	prof. Ing. Petr Humpolíček, Ph.D.
E-mail:	vichova@utb.cz

Annotation:

Despite recent advances in the creation of wound healing materials, wound management is still a major issue today. A number of steps are involved in wound healing, all of which work toward the eventual restoration of the damaged tissue. The material used for wound dressing serves as an extracellular barrier that guards against microbiological infiltration and possible harm to the wound. To address the limitations of standard treatments, the development of smart bioactive hydrogel dressings is at the center of attention. Naturally, polysaccharides (e.g. chitosan or alginate) have inherent properties that have made them attractive for wound healing therapy and therefore these biopolymers will be used for the preparation of hydrogels.

The doctoral study will be focused on the development, modification, and characterization of novel biopolymers-based hydrogels used for wound dressings. It is a multidisciplinary topic that involves chemistry, biology, and tissue engineering. The aim will be to develop hydrogel with properties including excellent stability, the ability to maintain the suitable pH required for wound healing, wound fluid enzyme tolerance, healing properties, and the ability to provide mechanical support and protection to the wound with sufficient elasticity. The key role will lie in the incorporation of bioactive substances to promote the healing properties of the final material.

Requirements:

Creative abilities, skills for working in laboratory.

Literature:

1. Pradas, M. M., & Vicent, M. J. (2015). *Polymers in regenerative medicine: biomedical applications from nano-to macro-structures*. John Wiley & Sons. Yyy
2. Freshney, R. I., & Vunjak-Novakovic, G. (Eds.). (2006). *Culture of cells for tissue engineering*. John Wiley & Sons.
3. George Broughton, I. I., Janis, J. E., & Attinger, C. E. (2006). Wound healing: an overview. *Plastic and reconstructive surgery*, 117(7S), 1e-S.
4. Kline, J. (Ed.). (2012). *Handbook of biomedical engineering*. Elsevier.
5. Baranoski, S., & Ayello, E. A. (2008). *Wound care essentials: Practice principles*. Lippincott Williams & Wilkins.