Annotation of Doctoral Thesis Topics for Degree Programme: Material Sciences and Engineering, course in „Biomaterials and Biocomposites“ for the Academic Year 2019/2020

Topic:	**Preparation of hydrogels based on hyaluronan and PVA**
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Annotation:

The thesis will be focused on preparation of hyaluronan based hydrogel scaffolds for cell growth or stem cell differentiation and growth. Hyaluronan is often used as a base material for hydrogels with application potential in tissue engineering. The hyaluronan – lignin composite will also be studied, as the latter is an efficient antioxidant and capable of heavy metals uptake. The main goal will be finding an effective hydrogel preparation technology. Moreover, the experiments with hyaluronan - chitosan – lignin system will be performed. The prepared hydrogels will be further analysed in the means of their application for scaffolds. Besides the technical, experimental and knowledge background of the Department of Physics and Materials engineering, necessary for materials preparation, the developed materials biological activity can be studied in the bioreactor available at the Centre of Polymeric Systems.

Requirements:

Degree in "Materials engineering", "Polymer materials and technology" with focus on medical and pharmaceutical materials or related fields.

Literature:

1. Garg, H. G. and Hales, Ch. A. (Eds.): Garg, H. G.; Hales, Ch. A. *Chemistry and Biology of Hyaluronan.* (1st ed.); Elsevier: Oxford, UK, 2004, ISBN: 0-08-044382-6.
2. Collins, M. N., Birkinshaw, C.: Hyaluronic acid based scaffolds for tissue engineering—A review. *Carbohydrate Polymers*, 92(2) 1262-1279 (2013).
3. Gřundělová, L., Gregorová, A., Mráček, A., Vícha, R., Smolka, P., Minařík, A.: Viscoelastic and mechanical properties of hyaluronan films and hydrogels modified by carbodiimide. *Carbohydrate Polymers*, 119 142-148 (2015).