ТЕЗИСЫ ДОКЛАДОВ

INTERNATIONAL WORKSHOP

**«Multiscale Biomechanics and Tribology
of Inorganic and Organic Systems»**

МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ

**«Перспективные материалы с иерархической структурой
для новых технологий и надежных конструкций»**

**VIII ВСЕРОССИЙСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ
КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНЫМ УЧАСТИЕМ,
ПОСВЯЩЕННАЯ 50-ЛЕТИЮ ОСНОВАНИЯ
ИНСТИТУТА ХИМИИ НЕФТИ**

«Добыча, подготовка, транспорт нефти и газа»

DOI: 10.17223/9785946218412/19

**ACTIVE BIO CONTACT MECHANICS: CONCEPTS OF ACTIVE CONTROL OF WEAR
AND GROWTH OF THE CARTILAGE IN NATURAL JOINTS**

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The modern practice of treating patients with impaired motor functions often consists in replacing the natural joints with artificial ones. Currently, more than 1.5 million hip joint replacements are performed annually in the world, with a tendency to grow. Even if the replacement procedure is successful, replacement is often ineffective in the medium or long term, due to various complications. The necessity and importance of endoprosthetics in cases of significant damage to the joints, or with severe wear or partial destruction of the cartilage layer, as well as its damage during prolonged immobility, is beyond doubt. However, at the initial stage of the disease and deterioration of the mechanical properties of the joint, it is natural to ask what measures need to be taken to correct the situation and allow the joint to regenerate itself.

It is known that under certain conditions, the cartilage layer is able to regenerate. Namely, it is possible to restore damaged cartilage due to the growth of new cartilage tissue on its surface. This process is determined by the mitotic division of chondroblasts inside the perichondrium. The process of regeneration of cartilage tissue is extremely slow and depends on many factors, such as the type of damage. In this case, the key role is played by the type of mechanical loading of the articular joint. Mechanical loading plays a dual role. On the one hand, the load is necessary to maintain the normal functioning of the cartilage. Cartilage tissue does not contain blood vessels. The nutrition of cartilage cells is due to the diffusion of nutrients and oxygen from the synovial fluid located in the inter-articular space. To activate these diffusion processes, periodic mechanical loading of the joint is necessary. On the other hand, excessive mechanical loading can lead to wear and discontinuities in the cartilage body.

Therefore, the topical question is how to mechanically load the joint to promote the development of regenerative effects, while minimizing the influence of factors determining wear. In this presentation, the main principles of how to determine the type and nature of the mechanical action, which leads to the growth of the cartilage layer of the joints and its regeneration, will be discussed. Such mechanical action can then be used as a rehabilitation procedure or a physio-therapeutic procedure to preserve the function of the natural joint.