МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
ФАКУЛЬТЕТ ІНОЗЕМНОЇ ФІЛОЛОГІЇ
ТА СОЦІАЛЬНИХ КОМУНІКАЦІЙ

СОЦІАЛЬНО-ГУМАНІТАРНІ АСПЕКТИ РОЗВИТКУ СУЧАСНОГО СУСПІЛЬСТВА

МАТЕРІАЛИ V ВСЕУКРАЇНСЬКОЇ НАУКОВОЇ КОНФЕРЕНЦІЇ СТУДЕНТІВ, АСПІРАНТІВ, ВИКЛАДАЧІВ ТА СПІВРОБІТНИКІВ

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osteopontin mRNA and contain osteopontin protein in human atherosclerotic plaques; therefore, detection of osteopontin in macrophages has precedent. It also has been shown by immunohistochemistry. Osteopontin binds readily to hydroxyapatite and may mediate adherence of osteoblasts and osteoclasts to bone matrix through an arginine-glycine-aspartate integrin-binding sequence and amplify the calcification. In contrast, other literature sources state that osteopontin regulates negatively mineral deposit formation, and it is necessary to myofibroblast differentiation and activity, which are produced in the response to a profibrotic cytokine, transforming growth factor-1. OPN elaborated by stromal or inflammatory cells at sites of ectopic mineralization, binds to bioapatites and initially physically inhibits crystal growth. Binding of OPN to bioapatite simultaneously provides a recognition site and/or concentration gradient for macrophages and giant cells thereby leading to localized accumulation.

Conclusion: there is no definitive data about the role of osteopontin in the development of calcific aortic valve stenosis, that requires further studying.

THE NOBEL PRIZE IN PHYSICS 2016: REVIEW

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For the past 120 years, the Nobel Prize has honored scientists for discoveries that the committee feels most benefit mankind. And theoretical discoveries of topological phase transitions and topological phases of matter lead David J. Thouless (the University of Washington, Seattle), Duncan M. Haldane (Princeton University) and J. Michael Kosterlitz (Brown University) to getting The Nobel Prize in Physics 2016. Their work started in the USA in the early 1970s by identifying a completely new type of phase transition in 2D systems with topological defects. This became a powerful breakthrough in the theoretical understanding of matter mysteries, which created new perspectives on the development of innovative materials. [1]

The main idea of this work comprises two main terms – phase transition and topology. Phase transition it is a phenomenon when a substance suddenly changes its material properties. The simplest example is when water turns into ice with dropping temperature. Phase transition does

not always depend on the temperature; it may also be due to pressure or other quantities. The three researchers have now shown theoretically that the electrical properties of materials can also undergo such phase transitions. For instance, electrical resistance will abruptly change when there is a particular magnetic field applied. [2]

Topology describes properties that are preserved under defamations and manipulations. In topology an integral number called a topological invariant and can be assigned to all objects that share the same properties. One example of a topological invariant is the number of holes that object has. An orange, a ball and a muffin all have zero holes, so they can all be assigned the topological invariant and it equals zero. In contrast, a coffee cup and a bagel each having one hole and can be assigned a topological invariant that equals one. Objects can transform from one topology class to another unless a significant force is applied to them, like cutting, blowing or tearing. They are topological properties that are protected against small changes. This was noteworthy to scientists because microscopic objects are usually observed as being threshold. They typically can only survive in very specific conditions, but physicists observed some objects that had surprisingly robust properties. They were puzzled by these exceptions. [3]

The laureates discovered that the robust properties were caused by the topological nature of the electrons in those objects. From this realization Thouless used topology to explain the famous quantum Hall effect experiment. This experiment showed that in very thin layers and in the presence of high magnetic fields electrons behave in such a way that the conductance to the system is robust against disorder and can only change in steps as the magnetic field is increased. Duncan was able to explain this behavior by assigning an integer N to each of the conductance steps observed. Later all day and predicted that a similar effect as possible without having a magnetic field. Before scientists believed phase transitions could not occur in extremely thin layers of matter. However, Kosterlitz and Thouless found that it was possible for vortices to appear in some 2D materials because of the topological nature. They found that each vortex could be assigned an integral number determined by the number of times it turns. At low temperatures the vortices are always seen in tight pairs that stay together. These pairs influence the electric conductivity of the matter but when the temperature is raised the vortex pairs break away from each other. This is a completely new kind of phase transition. Finally, Haldane studied one dimensional chain of atomic magnets. He found another example of topological order. Some different type of topological

object explains the change from conducting to insulating behavior of the chain. [4, 5]

The theoretical discoveries are mostly for science. Even so, it is important to understand that the ideas developed by the Nobel laureates have sparked revolutions in many other fields. Scientists hope that these discoveries can be applied to the development of new materials used for electronics. In particular, such topological phenomenon is a big step towards understanding of superconductivity as fundamental work in quantum's matter theory and might eventually result in awesome computers. There has also appeared some sort of transistors that starts to use these concepts.

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NICHE BOOK BIO-MEDICAL CONTENT, THEMATIC PRIORITIES AND SOCIAL AND COMMUNICATION PRACTICES

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In our study there will be analyzed books from specialties that establish the general laws inherent in life in all its manifestations. And that is a bio-medical direction. Just they will act as an **object of study**. **The subject of study** will become texts and illustrations in all forms of media from books on biology, genetics and ecology, humane and veterinary