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AUXETICS 2019 – the 15th International Conference and 20th Workshop on Auxetic Materials and Related Systems

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Between 2nd and 6th September 2019 the annual meeting of scientists working on materials exhibiting negative Poisson's ratio (called auxetics) was held in Będlewo near Poznań (Poland) in the Mathematical Research and Conference Center of the Institute of Mathematics of the Polish Academy of Sciences (PAS), see Fig. 1.

Fig. 1. The Będlewo Palace

The conference and workshop were hosted by the Institute of Molecular Physics (IMP) of the PAS, see Fig. 2 and Fig. 3.

As usual, the "International Conference on Auxetics and other materials and models with 'negative' characteristics", and the "International Workshop on Auxetics and Related

Fig. 2. The Institute of Molecular Physics of the Polish Academy of Sciences in Poznań

Fig. 3. Opening of AUXETICS 2019 by Prof. Zbigniew Trybuła, Director of the IMP PAS

Systems" attracted the attention of theoreticians, experimentalists, and computer simulators working not only in the area of intelligent materials, but also in the broad context of materials engineering.

More than sixty scientists from eighteen countries participated in this event to share their research. They prepared thirty four invited lectures and twenty oral presentations. The conference included two plenary lectures delivered by Dr. Roderic S. Lakes, Distinguished Professor of the University of Wisconsin-Madison, Wisconsin, USA, and Professor Dr. Martin Wegener from the Karlsruhe Institute of Technology in Germany. The first of the lectures was transmitted live from the University of Wisconsin with the help of the Poznań Supercomputing and Networking Center.

Posters prepared by young researchers were presented during the Young Researchers Forum. In this year, three young researchers were awarded ex-aequo prizes for the best posters. These were: MScEng Mikołaj Bilski from the Poznań University of Technology, Poland, Dr. Krzysztof K. Dudek from the University of Zielona Góra, Poland, and BSc James N. Grima-Cornish form the University of Malta, Malta.

The study of auxetic materials comprises many aspects. Thus, the broad and diverse topics presented came with no surprise. The conference participants had the opportunity of getting acquainted with the most recent results of theoretical research and computer simulations performed with various methods, as well as with the cutting-edge experimental results. Among others, the results concerning structures with tunable thermomechanical properties or effects of topological optimisation of auxetic structures have been described. With the help of particle methods (Molecular Dynamics and Monte Carlo) and continuum (Finite Element Method) computer simulation techniques, the impact and fracture resistance of auxetic models and other metamaterials with magnetic and nonmagnetic inclusions have been analysed. Alongside the theoretical studies, the results of experiments with the use of various techniques have also been presented. The ideas and the results of early studies aiming at practical application of these novel materials in medicine (among others auxetic stents), textile industry (auxetic fabrics), everyday items (such as auxetic furniture), and in applications aiming at increasing personal safety (such as applications in protective sports devices) have been brought forward. As usual, the atmosphere of the meeting fostered the exchange of ideas and experiences among participants and once again, the meeting served as a platform on which fundamental research meets applications.

To ensure a pleasant atmosphere of the meeting, the organisers prepared a number of attractions for participants. Evenings were filled by social events like welcome party, a classical musical concert (performed by artists from the Poznań Philharmonic, see Fig. 4), excursion and banquet. During the excursion the participants visited Gniezno (see Fig. 5 and Fig. 6), one of the oldest cities in Poland.

Fig. 4. The music concert performed by the Classic Quartet

Fig. 5. The Gniezno Cathedral

Fig. 6. The underground of the Gniezno Cathedral

In order to acquire more information on the conference, the reader is invited to visit the official conference web page: www.auxetics.eu/meetings/2019.

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ence Centre, Mr. Sławomir Malecha, and his co-workers for their excellent organisation of the meeting.

One of us (KWW) is indebted to Prof. Dr. Roderic Lakes for accepting the invitation to deliver a plenary lecture and to Dr. Eng. Maciej Stroiński, the Deputy Director of the Poznań Supercomputing and Networking Center (Poland), for his help in making this intercontinental lecture possible. He is also grateful to Professor William G. Hoover, Emeritus Professor of the California University at Davis, USA, for very helpful correspondence.

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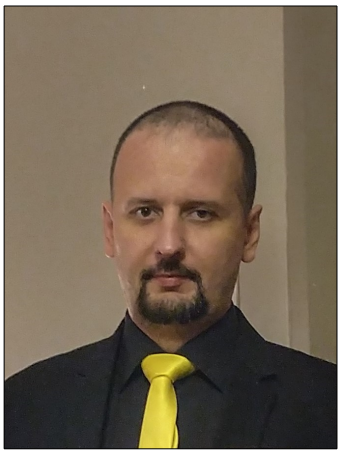

Jakub Wojciech Narojczyk received the MScEng degree in technical physics at Poznań University of Technology. He earned the PhD from the Institute of Molecular Physics of the Polish Academy of Sciences in Poznań (IMP PAS). He is a computational physicist with a strong background in Monte Carlo and Molecular Dynamics simulation methods. He has in-depth knowledge of ANSI C programming language and a solid experience in administration of GNU/Linux class operating systems as well as High-Performance Computing environment. He guest co-edited one special issue of Physica Status Solidi B and four abstract books from the conferences on Auxetics and Related Systems. He is a peer reviewer for known scientific journals in physics, among others: Applied Physics Letters, Applied Sciences, Advanced Theory and Simulations, Carbon, Materials and Design, Physica Status Solidi B, and Technologies. He works as an Adjunct Professor in the IMP PAS, where he conducts research (by means of computer simulations) on elastic properties of model materials, with the emphasis on their Poisson's ratio. The research are aimed at search for systems for which the Poisson's ratio takes negative values (such materials are called auxetics), as well as searching for mechanisms and phenomena responsible for the decrease of the Poisson's ratio of materials. Currently, his studies are focused on the influence of various forms of nanoinclusions in the atomic structure on the elastic properties (Poisson's ratio in particular) of various model systems.

Krzysztof Witold Wojciechowski is a Full Professor and the Head of the Division of Soft Matter Physics and Functional Materials as well as the Group of Computational Physics of Complex Systems at the Institute of Molecular Physics of the Polish Academy of Sciences (IMP PAS). He is also a Full Professor at the President Stanisław Wojciechowski State University of Applied Sciences in Kalisz. He received the MSc degree in theoretical physics and the MSc degree in mathematics from the Adam Mickiewicz University in Poznan. He earned the PhD in physics from the IMP PAS, where he also habilitated. His research interests concern, among other topics, statistical-mechanics of hard-body systems, algorithms for simulations of many-body systems, auxetics and influence of various mechanisms on the Poisson's ratio of condensed matter systems, materials with unstable inclusions, generators of (pseudo)random numbers, applications of fractional derivative in physics, and exotic liquid crystalline phases. He is an author and co-author of more than 200 research papers written in English, Russian and Polish. He guest co-edited more than two dozen thematic issues (on auxetics and related materials, mechanics of continuous media, statistical mechanics of condensed matter, computer simulation methods, nonlinear and disordered systems) in international journals, including: 13 in PSSb, 4 in J. Non-Cryst. Solids., 2 in Smart Mat. Struct., 2 in J. Mech. Mat. Struct., 2 in Rev. Adv. Mat. Sci., 1 in Materials, and 1 in Mol. Phys. Reports. He is a member of the Editorial Board of the CMST and TASK Quarterly.