Auxetics and other systems of “negative” characteristics

WOJCIECHOWSKI, Krzysztof W., SCARPA, Fabrizio, GRIMA, Joseph N. and ALDERSON, Andrew <http://orcid.org/0000-0002-6281-2624>

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Auxetics and other systems of “negative” characteristics - Preface

This is the eleventh issue of Physica Status Solidi (b) focussed on materials and models exhibiting negative Poisson’s ratio (PR), called auxetics, and other systems of „negative” characteristics [1]. It contains 22 papers, from which the first 17 papers concern auxetics, the following 4 are related to negative stiffness, and the last paper describes auxetic-like magneto-elastic effect.

The issue starts from the paper by Chan Soo Ha, Michael E. Plesha, and Roderic S. Lakes describing a chiral, isotropic model with negative Poisson’s ratio. The following paper by Teik-Cheng Lim presents another macroscopic model of auxetic properties. The elastic properties of hexagonal auxetics under pressure are discussed by Robert V. Goldstein, Valentin A. Gorodtsov, and Dmitrij S. Lisovenko.

Experimental studies of temperature, pressure and time influence on induction of auxetic response in needle-punched nonwovens is described by Prateek Verma, Meisha L. Shofner, Angela Lin, Karla B. Wagner, and Anselm C. Griffin. Kim Alderson, Shonali Nazare, and Andrew Alderson discuss large-scale extrusion of auxetic polypropylene fibre.


Another four papers discuss the phenomenon of negative stiffness (or compressibility). Stability of two-dimensional discrete mass-spring systems with negative stiffness springs is studied by Maxim Esin, Elena Pasternak, and Arcady Dyskin. Daphne Attard, Roberto Caruana-Gauci, Ruben Gatt, and Joseph N. Grima discuss negative linear compressibility in models consisting of rotating rigid units. Nano networks exhibiting negative linear compressibility are considered by Joseph N. Grima, Edera P. Degabriele, and Daphne Attard. Effects of negative stiffness on bulk and shear responses of ferroelastic materials via phase field modelling in two dimensions are described by Yun-Che Wang and Meng-Wei Shen.

Finally, Ganesh Raghunath, Alison Flatau, Hui Wang, and Ruqian Wu present and discuss experimental data and computer simulation results which reveal magnetoelastic auxetic-like behaviour in galfenol.

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Pierre Brincat, without whom this volume would not contain some of the submissions, are also acknowledged.

Krzysztof W. Wojciechowski (Institute of Molecular Physics, Polish Academy of Sciences, Poznan, Poland)
Fabrizio Scarpa (Advanced Composites Centre for Innovation and Science, University of Bristol, UK)
Joseph N. Grima (Faculty of Science, University of Malta)
Andrew Alderson (Materials and Engineering Research Institute, Sheffield Hallam University, UK)

REFERENCES