eXPRESS Polymer Letters Vol.11, No.12 (2017) 935
Available online at www.expresspolymlett.com
https://doi.org/10.3144/expresspolymlett.2017.89

Editorial corner – a personal view
Composites' damping – an actual challenge

J. Karger-Kocsis[1*], *Z. A. Mohd Ishak*[2]

[1]Department of Polymer Engineering, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Muegyetem rkp. 3., H-1111 Budapest, Hungary
[2]Cluster for Polymer Composites, Science and Engineering Research Centre, Universiti Sains Malaysia, Engineering Campus, 14300 Nibong Tebal, Pulau Pinang, Malaysia

Acoustic and vibration damping became an important design aspect of engineering structures made of polymer composites for different applications. Need for damping, having also a big societal and environmental impact, is fueled among others by the appearance of powerful engines generating dynamic/cyclic loads in the respective parts and in their neighborhood. Damping is usually achieved by passive and/or active means. Passive damping makes use of structural modifications whereby triggering various energy dissipation mechanisms. The related strategies focus on modifications of the matrix, reinforcement and interphase/interlayer. To enhance the viscoelasticity of the matrix, which is temperature and frequency dependent, incorporation of (nano)fillers, setting an inhomogeneous crosslinked structure, blending, creation of (semi)interpenetrating networks are the most promising tools. Hybridization of the reinforcing fibers with more viscoelastic (e.g. polyethylene) and hollow (such as plant fibers) ones is also quite a straightforward option. Use of polymer coated or hierarchical fibers (by whatever means produced) promoting slippage phenomena in the interphase may further widen the options for efficient damping. Electrospun nanowebs could replace the earlier favored constrained viscoelastic layers in advanced composites because they do not deteriorate the in-plane properties. Interphase engineering via 3D printing techniques (https://doi.org/10.3144/expresspolymlett.2017. 50), combined eventually with laser texturing, may give a new impetus for the damping-related research with composites. Active damping requires sensors and actuators along with a power source when the related patches, elements are not internal shunted. For active damping piezoelectric ceramics and polymers are still the first choice, followed by electro(magneto) strictive materials (including polymers) and shape memory alloys. Among the emerging active damping materials electroactive polymers (ionomeric polymer-metal composites, conductive polymers) should be mentioned. Their embedding into composites is a further challenging task. Since damping depends also on the composite's lay-up, suitable methods should be selected for coupon testing. Transfer of the related results to real parts is the next task. Modeling (especially using finite elements) is a basic prerequisite of the development of 'dampened' composites. Did we rise your interest to work on this interesting research field?

Prof. Dr. Zainal Arifin Mohd Ishak
Member of the International Advisory Board

Prof. Dr. Dr. h.c. József Karger-Kocsis
Editor-in-Chief

*Corresponding author, e-mail: karger@pt.bme.hu