SPEAKER

NAME
Prof. William W. Sampson, Professor of Materials Modelling

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BIOGRAPHY
Bill Sampson is Professor of Materials Modelling in the Department of Materials at the University of Manchester. Bill graduated from UMIST in 1989 with a BSc in Paper Science; he remained in that department to study for his PhD, which provided theory describing the evolving structure and flow resistance of fibrous materials in filtration processes. On award of his PhD in 1992, he immediately joined the Faculty as a Lecturer, becoming Senior Lecturer in 2004 and Professor in 2013.
Bill's research involves the application of scientific methods to the modelling and characterization of heterogeneous materials, with emphasis on their structure and its influence on properties. Bill has worked extensively on the properties of paper, nonwoven textiles, composites and fibrous filtration and the structure of electrospun polymer fibre networks. Current work considers the structure and damage tolerance of silver nanowire networks for transparent displays, conductive polymer composites and the development of statistical theoretical frameworks for the self-assembly of aggregating colloidal systems.
Bill is a Trustee, Director and member of the Pulp and Paper Fundamental Research Society, and was Programme Chair for the four-yearly Pulp and Paper Fundamental Research Symposia in 2005, 2009 and 2013. He is a member of PAPTAC, TAPPI and Appita and a Fellow of the Institute of Materials, Minerals and Mining.

LECTURE

Weight- and scale-dependence of tensile properties of transparent nanofibrillated cellulose films

The literature characterising the mechanical properties of transparent nanofibrillated cellulose films provides values for tensile strength and modulus in excess of 200 MPa and 12 GPa, respectively. However, the literature reports also values far lower than these often arising from samples of different weights and dimensions tested at different rates. He we report measurements of the tensile properties of a family of NFC sheets with a range of grammages and on 60 g m-2 sheets tested with different sizes and strain rates. For samples of length 200 mm or less, we observe essentially a single relationship between tensile index and strain rate over 4 orders of magnitude of strain rate. Over the same range of strain rates, we observe a scalable dependence of specific elastic modulus for samples up to 400 mm in length. We compare our results with data from commodity grades of transparent papers.