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New Platforms for Characterization of Biological Material Failure and Resilience Properties. KATHERINE BROWN, Cavendish Laboratory, University of Cambridge. UK; Dept. of Chemistry, University of Texas at Austin, BENJAMIN J. BUTLER, Cavendish Laboratory, University of Cambridge, UK, THUY-TIEN N. NGUYEN, DAVID SORRY, Department of Physics and Centre for Blast Injury Studies, Imperial College London, UK, ALUN WILLIAMS, Department of Veterinary Medicine, University of Cambridge, UK, WILLIAM G. PROUD, Department of Physics and Centre for Blast Injury Studies, Imperial College London, UK — Obtaining information about the material responses of viscoelastic soft matter, such as polymers and foams has, required adaptation of techniques traditionally used with hard condensed matter. More recently it has been recognized that understanding the strain-rate behavior of natural and synthetic soft biological materials poses even greater challenges for materials research due their heterogeneous composition and structural complexity. Expanding fundamental knowledge about how these classes of biomaterials function under different loading regimes is of considerable interest in both fundamental and applied research. A comparative overview of methods, developed in our laboratory or elsewhere, for determining material responses of cells and soft tissues over a wide range of strain rates (quasi-static to blast loading) will be presented. Examples will illustrate how data are obtained for studying material responses of cells and tissues. Strengths and weaknesses of current approaches will be discussed, with particular emphasis on challenges associated with the development of realistic experimental and computational models for trauma and other disease indications.

Katherine Brown
University of Cambridge, UK; University of Texas at Austin

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