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## Multi-scale deformation analysis in a thermoplastic polyurethane

Alexander M Korsunsky and Tan Sui  
University of Oxford, UK

Thermoplastic polyurethane (TPU) elastomers are applied in a variety of situations, from medical devices to sports equipment. The block co-polymer structure of these materials engenders nano-scale structural inhomogeneities, resulting in non-uniform strain fields that depend on the scale of consideration. In order to elucidate the nature of deformation in such materials, we focus our attention on the transition between the hard and soft regions that have been called "fuzzy interfaces". To obtain experimental insights into these deformation phenomena we used a range of synchrotron X-ray methods ranging from imaging to small angle scattering (SAXS) to diffraction (WAXS). Subsequent analysis by finite element modeling (FEM) and fast Fourier transformation (FFT) allowed agreement to be achieved between predicted and observed scattering patterns, providing the explanation for the observed 'strain deficit' at the nano-scale.

### Biography

Alexander M Korsunsky is experienced in engineering microscopy of materials systems and structures for optimization of design, durability and performance at the University of Oxford, UK. He leads the Centre for *In-situ* Processing Science (CIPS) at Research Complex, Harwell. He is a Consultant at Rolls-Royce Corp. on matters of residual stress and structural integrity, and is an Editor-in-Chief of *Materials & Design*, a major Elsevier journal (2016 impact factor 3.997). He has done his Doctor of Philosophy (DPhil) from Merton College, Oxford, and undergraduate education in Theoretical Physics. He was a Junior Research Fellow at Fitzwilliam College, Cambridge, and Lecturer at Newcastle University.

alexander.korsunsky@eng.ox.ac.uk

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