

In depths of paper degradation: A microscale experimental methodology

Speaking of conservation of articles in museums and collections there is no question about the importance of better understanding of how paper degrades. Loss of mechanical properties, due to degradation through the ages, dramatically influences the accessibility of books, artworks and documents. The change in these properties starts from the atomic level and travels across scales to result in tangible changes in the scale of the sheets of paper. One of the most relevant changes is the loss of mechanical properties of paper. Advanced measurement techniques make it possible to dive into the depths of these processes in smaller scales than before with impressively high accuracies. The current study focuses on the development of a thorough experimental methodology to study the mechanical behaviour of individual cellulose fibres. *In-situ* micro-tensile testing with optical profilometry in combination with Digital Image Correlation (DIC) technique results in high accuracy mechanical characterization of single cellulose fibres. Such detailed assessment of cellulose fibres' properties can be applied to naturally aged paper samples, or combined with accelerated aging experiments to shed valuable light on the degradation of paper, and provide better guidance for conservators.