Moisture Management Testing by Magnetic Resonance Imaging (MRI) and Multidirectional Wicking

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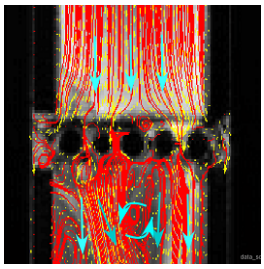
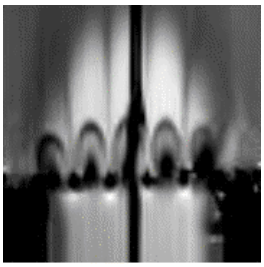
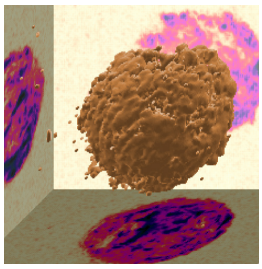
Moisture movement in textiles, important for wet processing and end-use performance, can be characterized by a number of standard techniques. The standard techniques are great for relative comparisons of bulk behavior, but fall short when more detailed information on moisture distribution and flow is desired. In this talk I will discuss work on the development and application of two methods for moisture management testing: magnetic resonance imaging (MRI) and multidirectional wicking. Magnetic resonance imaging (MRI), well-known for its applications in the medical field, provides advantages for measurements of moisture in complex substrates, moisture distributions and transport. Selected examples will be presented to demonstrate how MRI can be used *quantitatively*, which is not typically an important goal of medical MRI but critical for engineering applications. A multidirectional (i.e., upward, horizontal, downward) wicking test was developed to provide intrinsic quantitative descriptors of fabrics that can be used to predict wicking behavior. The test will be described and its application demonstrated.







Haskell Beckham is a Principal Scientist at Exponent, a scientific and engineering consulting firm, and an adjunct Professor in the School of Materials Science and Engineering at the Georgia Institute of Technology (Atlanta, USA). He earned a B.S. in textile chemistry from Auburn University and a Ph.D. in chemistry from the Massachusetts Institute of Technology (MIT). After graduating from MIT, Dr. Beckham was an NSF and then Humboldt postdoctoral fellow at the Max-Planck-Institute for Polymer Research in Mainz, Germany. He joined the faculty at Georgia Tech in 1993 and was promoted to full professor the same year he was awarded a Fiber Society lectureship and a fellowship from the Japan Society for the Promotion of Science. Current research interests include evaluation of polymers and textiles in consumer and industrial products for failure analysis, patent litigation support, product design and development support.