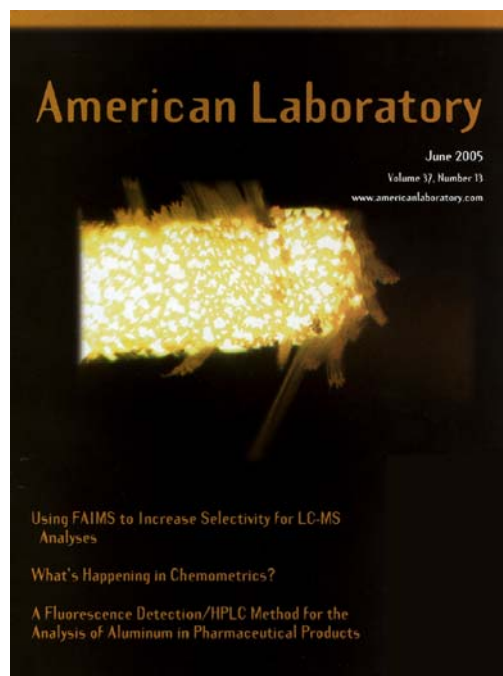




Professors Ken Marcus (Chemistry), Igor Luzinov (Materials Science and Engineering), and Phil Brown (Materials Science and Engineering) have incorporated as Specialty and Custom Fibers, LLC. The company is developing capillary channeled polymer fibers for a wide range of applications. Applications of the shaped, modified fibers include liquid chromatography, solid phase extraction, waste remediation, protein purification, cell and tissue growth, specialty textiles (military, sporting goods, etc.), and agriculture growth media

[From sweaty socks to smart separations.](#)

Everyone knows that dirt, grime, sauce, wine and coffee can stick to clothes. In many cases the stains are very difficult to get out. Researchers at Clemson have made use of this everyday problem and turned everyday fiber materials like polyester into devices that can be used for the separation of chemical and biological molecules. Professor Phil Brown (Materials Science & Engineering) extrudes polymer fibers that possess a unique shape and geometry. When these fibers are bundled together in a column they act as capillary channels or fluid conduits. These fluid channels allow mixtures of chemicals or biological molecules to flow over them at different rates by capillary action. Professor Ken Marcus (Chemistry) realized that these fibers could be used in high performance liquid chromatography for chemical separations. Under pressurized liquid flow regimes a chemical mixture can flow across the fiber surfaces, partially absorb (just like stains on clothing) and the chemicals come off them at different rates. This results in rapid chemical separations at relatively low pressures and with a low cost starting material. Professor Igor Luzinov (Materials Science & Engineering) has the ability to modify the surface with polymer nanolayers to make highly specific separations possible. These three researchers have now integrated their interests and capabilities in an attempt to revolutionize the ways that chemical separations can be accomplished.



[Capillary Channeled Polymer Fiber Wicking Video](#)

The Inventors:

Philip J. Brown:

Dr. Brown, an assistant professor in the School of Materials Science and Engineering at Clemson University, joined the faculty in January 2002. He earned a BSc in 1987 and received a Ph.D. from the School of Textile Industries in Leeds in 1991. After a few years research work, including 1.5 years at Herriot Watt University as a teaching/research fellow, he went back to Leeds as a lecturer in the School of Textile Industries.

Dr. Brown's current research interests include, but are not limited to, fiber spinning and the production of deep groove capillary surface channeled fibers, fabrication of polymeric photonic crystal fibers, the production and properties of hollow fiber membranes including examination of phase inversion conditions. In addition to the dry jet wet and wet spinning of fibers, he is interested in electrospinning of fibers and nanofibers. Additional interests are in the broader areas of dyeing and finishing, including self cleaning fabrics/ultrahydrophobic surfaces and fibers, the crosslinking of synthetic fibers and the application of UV laser radiation to textile substrates.

R. Kenneth Marcus:

Dr. Marcus earned B.S. degrees (1982) in chemistry and physics from Longwood College and a Ph.D. (1986) in analytical chemistry from the University of Virginia. Since joining the Clemson faculty in 1986, Dr. Marcus has graduated over 30 Ph.D. and MS students in research that has continually been focused on analytical instrumentation development. That work has resulted in ~10 US and international patents and over 125 journal publications. He serves on the editorial advisory board for four international journals and was the recipient of the 2001 S.C. Governor's Award for Excellence in Science Research.

Igor Luzinov:

Dr. Luzinov received a M. S. degree in Chemical Engineering and Technology in 1985 and a Ph. D. degree in Polymer Chemistry in 1990 from Lviv Polytechnic Institute (Ukraine). Prior to joining the faculty of Clemson University, he served as a Senior Research Scientist at Physical Chemistry Institute (National Academy of Science of Ukraine), NATO Research Fellow at Center Education and Research on Macromolecules (University of Liege, Belgium) and Postdoctoral Research Associate at Iowa State and Western Michigan Universities.

Since joining the Clemson faculty in 2000, Dr. Luzinov has graduated 4 students (1 Ph.D. and 3 MS) in research that has continually been focused on surface modification of various substrates. The main goals of the program are to develop the synthetic approaches that will enable assembly of submicron polymer films with desired structures and properties.