Introducing the Winners of 2012-2013 SPE® ACCE Graduate Scholarship Awards

Winning students whose composites-intensive projects were judged to have the greatest potential impact on ground transportation in this year's ACCE scholarship competition were John Hofmann, who is working on a doctorate in Macromolecular Science & Engineering at Virginia Polytechnic Institute & State University (Virginia Tech) and Alper Kiziltas who is pursuing a Ph.D. in Forest Resources at the University of Maine. Each student will receive a total scholarship of $2,000 USD and will return to present the results of his research at next year's SPE ACCE show, September 10-12, 2013.

John Hofmann's research will focus on extension of the Method of Ellipses (MOE) for measuring the orientation of long, semi-flexible glass fibers to help predict final fiber orientation in injection-molded parts. He points out that there are numerous commercial benefits of glass-reinforced polymer composites, which are widely used in numerous industries, including automotive. However, the magnitude of the benefits are highly dependent not only on polymer matrix plus length, type, fiber-volume fraction, and form factor of reinforcement used, but also on processing conditions and final fiber orientation in the part.

Hofmann adds, "The primary thrust of my research is to evaluate the feasibility of extending the Method of Ellipses from short, rigid-fiber composites to long, semi-flexible fiber systems. In the coming year, I'll evaluate a number of research objectives, including looking at both short- and long-fiber orientations in complex geometries, possibly making modifications to the traditional method's image analysis width, doing a comprehensive study of experimental fiber orientation behavior in areas like the sprue and immediate entry region of the tool, and looking at long fiber flexibility to develop a method to experimentally quantify the extent of fiber curvature."

After completing a Bachelor's degree in Chemical Engineering at Case Western Reserve University, Hofmann moved on to graduate school at Virginia Tech. He is currently in his fourth year in the Macromolecular Science and Engineering program working towards a Ph.D. He is advised by Dr. Don Baird and works in the Polymer Processing lab in the Department of Chemical Engineering. The main focus of his research is on glass fiber-reinforced injection-molded composites. After graduation, Hofmann plans to head to industry but stay in research.

Alper Kiziltas plans to explore the use of engineering thermoplastics reinforced with natural fillers for certain automotive underhood applications where conditions are too severe for commodity plastics. Using a combination of microcrystalline cellulose, wood flour, hemp, flax, and kenaf fibers to replace conventional reinforcements such as glass fiber, carbon fiber, nanoclay, and minerals, he hopes to be able to formulate high specific-strength and modulus materials that are low-cost, low-density, easy-to-process, offer thermal and acoustic insulation, easy surface modification, low abrasion to molds, biodegradability, renewability, and global availability. He will concentrate on polyamide (PA, also called nylon) 6 and 6/6 as well as a blend of polyethylene terephthalate (PET) and polytrimethylene terephthalate (PTT).

Kiziltas adds, "The common belief is that natural filler reinforcements for thermoplastics are limited to low-melting commodity thermoplastics with melting points below 180°C rather than higher temperature, higher performance engineering thermoplastics with higher melting points of 220°C or above. My research and patent applications have previously demonstrated that these beliefs are untrue. I have succeeded in making thermoplastic composites combining microcrystalline cellulose (MCC) using nylons and thermoplastic polyesters with melting points above 220°C and 260°C respectively. In the next phase of my research, I'll produce engineering thermoplastic composites with various natural fiber reinforcements and MCC and then evaluate their resulting thermal and mechanical properties."

Upon obtaining an undergraduate degree in Forest Products Engineering from Karadeniz Technical University, Trabzon, Turkey, Kiziltas was awarded a prestigious scholarship from the Turkish government to attend graduate school at the Karadeniz Technical University Graduate School. In the Spring of 2006, the Republic of Turkey/Ministry of National Education awarded him a full scholarship to pursue graduate studies in wood science and technology in the United States. He enrolled in the School of Forest Resources at the University of Maine in the fall of 2007, obtained a Master's of Science degree in August of 2009, and is currently enrolled in the School of Forest Resources' Ph.D. program from which he expects to graduate next year. After school, Kiziltas hopes to work in automotive research developing natural fiber-reinforced components for passenger vehicles.

Hear Hofmann present *The Effect of Glass Fiber Length on Orientation Distribution within Center & End Gated Injection Molded Composites* in the Virtual Prototyping & Testing session (Amphitheater 102) on Tuesday, September 11 from 10:00-10:30 a.m.

Kiziltas will present two papers on Tuesday, September 11 in the Bio & Natural Fiber Composites session: *Natural Fiber Blends Filled Engineering Thermoplastic Composites for Automobile Industry* from 1:15-1:45 p.m. and *Utilization of Carpet Waste as Matrix in Natural Fiber-Filled Engineering Thermoplastic Composites for Automotive Applications* from 2:15-2:45 p.m.