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STRONG AS METAL, YET LIGHTWEIGHT NANOCOMPOSITE MATERIALS FROM THE MIND OF PH.D. STUDENT

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Ryan Poling-Skutvik, a Ph.D. candidate in chemical and biomolecular engineering at the Cullen College, took first place in the graduate student poster competition at the [Society of Rheology](#) Conference in Tampa, Florida.

Poling-Skutvik presented research on understanding the behavior of nanocomposite materials. Nanocomposites are materials that combine nanoparticles with polymers.

"Nanocomposites are extremely exciting materials because they can have the strength of a metal but the flexibility and process ability of a plastic material," said Poling-Skutvik. Because of their unique properties, composites have become an important industrial product, comprising about 50 percent of Boeing's newest 787 Dreamliner airplane. Poling-Skutvik focuses on understanding the physics of how the mechanical properties of these materials are enhanced.

Poling-Skutvik said the strength of polymer materials comes from the dynamics of the polymer chains. When nanoparticles are added to polymer, the motion of the nanoparticles and their effect on the polymer chains can significantly impact how the material performs.

"Experimentally, it is very challenging to determine how the nanoparticles affect the polymer because most techniques measure both the particles and the polymer at the same time," said Poling-Skutvik. "We have developed a system that allows us to measure the motion of both the particles and the polymer individually and on the same sample. Thus, we can directly investigate how the particles change the dynamics of the polymers and how the overall material will perform."

Eventually the research may lead to the development of improved composite materials that can provide all the support of a metal while being extremely durable, light-weight and easy to process and mold into any shape, he added.

Poling-Skutvik is excited about winning first place. "The Society of Rheology is the premier organization

studying how materials flow and move, and the other posters at this conference were very impressive. After graduation, I am aiming to go into academia so receiving the award based on the judgement of established academics is extremely validating," he said.

Poling-Skutvik's advisors are Jacinta C. Conrad, Ernest J. and Barbara M. Henley associate professor of chemical and biomolecular engineering and Professor Ramanan Krishnamoorti.