Thrust 6. High Performance Material Processing and Additive Manufacturing

John Coulter (MEM), Wojciech Misiolek (MSE/MEM), Leslie Chow (MSE/BioE), Hannah Dailey (MEM), John DuPont (MSE/MEM), James Gilchrist (ChBE), Joachim Grenestedt (MEM), Gary Harlow (MEM), Sabrina Jedlicka (MSE/BioE), Yaling Liu (MEM/BioE), Stephen McIntosh (ChBE), Herman Nied (MEM), Alparslan Oztekin (MEM), Raymond Pearson (MSE), Brian Slocum (AAD), Rick Vinci (MSE), Masashi Watanabe (MSE), Edmund Webb III (MEM), Emory Zimmers (ISE)

In the manufacturing arena an overarching primary goal is to produce distinctive high quality products at an appropriate throughput rate while minimizing the costs and energy required to do so. Accordingly, the current thrust within I-FMD is focused on the advancement of material processing science to yield optimal product performance outputs and/or significantly reduce the associated manufacturing energy needs and overall production costs. Collectively the team is advancing a number of manufacturing processes, but a particular focus at the present time is on additive manufacturing.

Science Based Processing for Optimal Product Performance

While materials selection and shape are often viewed as the determinants of object performance, in reality the properties of engineered products evolve throughout and significantly depend on the manufacturing processes utilized. With this in mind, a number of new and existing manufacturing processes are being advanced scientifically to enable true and comprehensive optimization of product performance for targeted application areas.

Energy Efficient Manufacturing

With the manufacturing industry both domestically and worldwide being a major contributor to society’s energy consumption needs, innovations in material processing that lead to energy savings can have enormous impact. By focusing on the temporal evolution of product quality during processing, researchers at Lehigh are identifying and developing a number of novel techniques to utilize less energy while still yielding desired final product performance quality outcomes.

High Performance Additive Manufacturing

While additive manufacturing technologies have improved significantly during recent years, the key to truly realizing the potential of this disruptive manufacturing approach is going to depend on developing capabilities to create customized and high performance products in this fashion. As part of the current thrust research teams at Lehigh are pursuing this goal with a number of targeted material systems and associated additive manufacturing processes in mind.