USU Engineering Researcher Gets Prestigious NSF CAREER Award | College of Engineering

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News Release — LOGAN, UTAH, April 20, 2018 — Utah State University professor and researcher Ling Liu will receive a major research grant for his work in developing more thermally efficient materials.

Liu, an associate professor of mechanical engineering who joined USU in 2012, was selected for a $500,000 CAREER Award from the National Science Foundation. The highly competitive grants are awarded to the nation’s most promising early career faculty who are leading cutting-edge research and serving as academic role models.

Liu’s work focuses on the understanding and design of materials at the molecular level. He and his colleagues are working to understand how various natural and synthetic materials formed through hydrogen bonds can improve thermal transport efficiency across a range of applications.

“The molecular structure of any material influences its thermal properties,” said Liu. “For example, proteins which are composed of amino acids linked through hydrogen bonds and other forces have shown some unique thermal transport characteristics.”

Through a better understanding of the thermal transport properties of naturally-occurring materials, Liu says it’s possible to engineer new materials that have desired and tunable thermal properties. These bio-inspired, hydrogen-bonded materials can significantly improve heat transfer efficiency. Liu says applications including synthetic spider silk and materials used in bio-implants, tissue regeneration, cancer treatments and even energy storage could be made more efficient. The researchers will look specifically at how new hydrogen-bonded materials could help make batteries more thermally efficient.

“We know hydrogen-bonded materials are good, so why not bring that idea into synthetic materials such as the electrode/seperator interfaces inside a battery? We believe we could increase thermal transport efficiency by almost an order of magnitude,” he said.

Liu says receiving a CAREER grant is an exciting opportunity. He thanked his five collaborators who are spread across the globe. He’s also using the grant funding to extend research opportunities to undergraduate students and female Native American students.

“This is a very important project to me, and it will bring my research in this area to a higher level,” he added. “I also feel excited about collaborating with experts in synthetic biology, theoretical chemistry and materials engineering.”

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