Laser Materials Processing Lab

IOWA

The **Laser Materials Processing Lab** pursues research on the advancement of material processing technology and sciences. Equipped with state-of-the-art laser processing systems, ultrasonic welders, and various manufacturing process monitoring and characterization tools, the lab develops innovative and highly functional surface textures that can repel water, ease disinfecting, or hold lubrication.

Research Topics

- High throughput nanostructuring for superhydrophobic & superwicking surfaces
- Laser processing of tunable THz metamaterials
- Development of new additive manufacturing, joining and machining technologies via lasers, ultrasonics & friction stir processes
- Data-driven modeling and simulations of materials processing & microstructures

Who We Work With

- National Science Foundation
- Naval Research Laboratory
- US Army
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- IPG Photonics
- General Motors
- GF Machining Solutions
- Purdue University
- Iowa State University

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Associate Professor of Mechanical Engineering, University of Iowa

- Laser Materials Processing
- Functional Materials
- Machining
- Joining & Welding
- 3D Printing
- Material Modeling

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RESEARCH FOCUS & HIGHLIGHTS

- **Fast Surface Nanostructuring:** Our research aims to develop a high-throughput laser-silanization based process to fabricate micro/nanoscale structures for metal alloys. The nHSN process is capable of achieving a **30,000x** faster production rate and processing of much larger surface areas (both flat and 3D curved surfaces) than existing laser technologies.
- **Tunable THz Bandpass Metamaterials:** Laser-based Metamaterial Fabrication (LMF) process for THz bandpass metasurfaces on dielectric substrates such as glass, quartz and polymers. This research presents a new electronically tunable THz bandpass optics which is also highly transparent in the visual spectrum.
- **Laser-Assisted Machining:** The objective of LAM research includes the following: higher material removal rates, improved surface quality, longer tool life, and less cost.
- **Laser Deposition Joining for Fiber-Reinforced Composites**
- **Data-driven Modeling and Simulations of Materials Processes**
- **Material Joining via Lasers, Ultrasonics and Friction Stir Processes**

LEARN MORE

Graduate student Martell Bell conducts surface processing experiments.

SCHEDULE A VISIT

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CONNECT WITH US

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