Graduate Student Research Seminar

Fall 2023

Femtosecond Laser-Induced Wettability Control on Copper: Exploring Laser Parameters and Influencing Factors

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3:00 pm (EST) – 132 Fluor Daniel Building

Abstract

Femtosecond laser-induced wettability control is applicable to a wide range of materials, including metals, polymers, ceramics, and semiconductors. This versatility makes femtosecond laser processing a valuable tool for diverse applications across industries. Using femtosecond lasers as a method to alter the wettability of materials involves modifying both surface morphology and chemistry in one single process. Copper, a versatile and widely used metal, finds applications across various industries due to its excellent electrical conductivity, thermal properties, and corrosion resistance. The extensive use of copper in electronics, construction, transportation, and energy systems underscores its importance in modern technology. However, optimizing the performance of copper surfaces is crucial for enhancing its functionality in diverse applications. Controlling the wettability of copper surfaces is one avenue to achieve this optimization.

This research focuses on the application of femtosecond lasers for wettability control on copper surfaces, with a specific emphasis on studying the effects of laser parameters and identifying influencing factors. The presentation highlights the application of femtosecond lasers for wettability control and explores the impact of laser parameters, such as pulse energy, repetition rate, scanning pattern and scanning speed. Systematic variations of these parameters provide insights into their role in shaping surface morphology and chemistry, contributing to a comprehensive understanding of how femtosecond laser processing influences copper wettability. In addition to studying laser parameters, the research investigates the broader factors influencing the wettability of copper surfaces. These factors include surface roughness, chemical composition, and environmental conditions. The presentation discusses the interplay between femtosecond laser-induced surface modifications and these influencing factors, providing a holistic view of the wettability control process.

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