

ME 600 Seminar

Anthony Locurto and Adam Lawrence

September 14 at 11:00 am in 2004 Black

Anthony Locurto: Metal oxide detection via supercontinuum laser absorption spectroscopy (SCLAS)

Abstract: Metal additives are found in various aerospace and defense systems for propulsion and damage enhancement applications. Thermodynamic quantities such as temperature and species concentration are beneficial indicators for system performance. However, these systems are challenging for standard sensors such as thermocouples due to the high temperatures and the fast time scales. Emission spectroscopy is implemented in many of these systems, but this technique presents challenges for quantitative species concentration measurements and is often biased to high-temperature regions. Absorption spectroscopy allows for line of sight measurement and the ability to quantify concentration, but metallized combustion systems have been limited to vapor phase metal atoms. We use supercontinuum laser absorption spectroscopy to monitor partial oxides of metal combustion. These results indicate the feasibility of this diagnostic for dynamic metal combustion systems including detonation environments and solid propellant combustion

Adam Lawrence: Microwave Interactions with Solid-state Energetic Materials

Abstract: This review explores the fundamentals of microwave interactions with solid-state energetic materials and how those interactions may allow enhancement and control of their combustion. Microwaves are useful for many applications due to their bandwidth and ability to transmit through the atmosphere and various materials. Fundamental theory is presented to explain important parameters governing microwave coupling and absorption within different energetic material ingredients. Mechanisms for microwave interactions with dielectric and conductive materials are discussed. Using this knowledge, the current body of literature is synthesized to elicit the many ways that microwave irradiation can interact with energetic materials. This analysis will help guide future research into promising avenues of study for maximizing the potential of current condensed-phase energetic materials and developing next generation energetics that are controllable using microwave irradiation.

This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students.

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