

AEROSPACE & MECHANICAL ENGINEERING



**2012 COLLOQUIUM 2013
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UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: Dr. Wenting Sun
Department of Mechanical and Aerospace Engineering
Princeton University
Princeton, New Jersey

**TOPIC: NON-EQUILIBRIUM PLASMA-ASSISTED COMBUSTION FOR
ADVANCED ENERGY CONVERSION AND PROPULSION**

DATE: Thursday, January 31, 2013

TIME: 3:30 p.m.

PLACE: Lower Level Auditorium, Geddes Hall

RECEPTION: 3:00 – 3:30 p.m. – Coffee House, Geddes Hall

ABSTRACT

About 85% of the energy in the world is produced by the combustion of fossil fuels. However, the growing concerns about emissions, and the development of advanced energy conversion and propulsion systems have pushed traditional combustion technology to challenging limits. To continue to develop these technologies, it is critical to develop new approaches to improve the performance of combustion. This presentation will discuss controlling combustion kinetics using non-equilibrium plasmas - plasma-assisted combustion. Plasma introduces new chemical pathways into the combustion process. This plasma chemistry occurs on very different time scales compared to conventional combustion chemistry and also introduces a large number of new species and reactions which have not been previously considered in combustion research.

The kinetic enhancement mechanisms of non-equilibrium plasmas on combustion are investigated through plasma-flame interactions in counterflow systems. It is found that the radical production from the plasma can dramatically modify the reaction pathways of combustion to create a new flame region at low temperatures. Advanced laser diagnostic techniques are used to quantify radical (atomic O and OH) productions from plasmas. Both experimental and simulation results show that atomic O is critical in controlling fuel oxidation at low temperature conditions.



Plasma (24 kHz, 15 W) assisted
methane flame

Methane flame without plasma

NOTE: *If you are interested in meeting individually with Dr. Sun, please contact Linda at 631-5431*