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MSE 690 SEMINAR SERIES

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ARMS 1010



STEVEN F. SON

Alfred J. McAllister
Professor of Mechanical
Engineering

Purdue University

“Engineered Energetic Materials (Propellants, Explosives and Pyrotechnics)”

Abstract: Energetic materials include propellants, explosives, and pyrotechnics. Although, some of these materials have been used for centuries, there is ample room for significant improvement. In this talk I will review what energetic materials are, as well as describe the increasing demands placed on them. These increasing requirements include improved performance, sensitivity, tailorability, toxicity, multifunctionality, and switchability. Synthesis chemists continually develop new molecules that are exciting, but there are just as powerful engineering approaches to achieve improved composites. This includes tailored particles and fabricated inclusions. Some strategies to engineer advanced energetic materials include additive manufacturing, nanofeatured particles, alloys, novel rapid mixing, and crystallization methods to encapsulate particulates such as catalysts. Experimental characterization methods of these materials will also be briefly described. Recent work at Purdue in this area will be summarized and future directions will be discussed.

Biography: Steven F. Son is the Alfred J. McAllister Professor of Mechanical Engineering at Purdue University and is affiliated with Purdue’s Maurice J. Zucrow Laboratories. He received his Ph.D. from the University of Illinois at Champaign-Urbana in 1994. Prof. Son’s research is in the field of combustion with an emphasis on novel energetic materials, including nanoscale energetic materials, microscale energetics (microenergetics), reactive materials, combustion synthesis, and explosives safety. Dr. Son has given invited presentations at national and international scientific meetings and is an author of over two hundred scientific publications. Before his academic career, beginning in 2006, he was a Technical Staff Member and J. R. Oppenheimer Fellow, Technical Staff Member, and Project Leader at Los Alamos National Laboratory in the High Explosives Sciences Group.



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