**abstract**

Energetic materials that include nano-scale aluminum (Al) particles have exhibited combustion behaviors dramatically different than their micron-scale counterparts. For example, composites that replaced micron with nano Al particles as the fuel and incorporate a metal-oxide, fluoropolymer, or another metal as the reducing agent demonstrate heightened ignition sensitivities (by up to 3 orders of magnitude) and increased deflagration (flame propagation) speeds. This presentation will discuss the unique combustion behaviors of nanocomposites for energy generation applications. Laser ignition and flame propagation studies will show that nanocomposite combustion cannot be described by classical diffusion mechanisms and a new theory based on melt dispersion will be presented that more accurately describes nano-particle reactions. The ignition sensitivity of these materials will also be explored for electrical stimuli and additives that enable tunable properties will be highlighted. These understanding promote their safe handling and use as well as introduce a whole new class of materials for diverse energy generation applications ranging from powering MEMS technologies to providing cleaner lead-free ordnance systems.

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**biosketch**

Dr. Michelle Pantoya received her PhD from the University of California, Davis in 1999 and joined the faculty in the Mechanical Engineering Department at Texas Tech University in 2000. As a Professor, her research focuses on developing nano-fuel particles that can be used to enhance our national safety and security. She has received many research awards including the US Presidential Early Career Award (PECASE) and the Department of Defense Young Investigator Program Award. Michelle has also co-authored two children’s books introducing engineering to young kids that have received national awards and recognition and actively works to promote engineering education in the early years.