



TEXAS TECH UNIVERSITY
Department of Mechanical Engineering

Printed energetics – the path towards additive manufacturing of munitions

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Abstract: In the past few years, additive manufacturing for energetic materials has been an area of increased interest to the DoD. Picatinny Arsenal has been a leader in this area for a number of years with efforts focused on fuzing and other small scale munitions. However, there are some major barriers to furthering this area to the point of full scale implementation for ordnance manufacturing. The first major barrier is the lack of off-the shelf printable energetic material systems. The second major barrier is that processing parameters and print technologies have not been developed that will lead to consistent printed ordnance with the desired performance.

Recent work at SDSMT has focused on addressing these two barriers. In these efforts printable propellant, pyrotechnic, explosive, and biocidal formulations have been developed and the prerequisite rheological and other properties characterized. As a result, fundamental knowledge has now been gained that can be translated for the development of various print technologies and to fellow researchers at the DoD. For example, the necessary particle sizes, polymers, viscosity, and print technologies for printing munitions will be discussed using examples from recent work on high solids loaded polymer bound reactives.

Bio: DR. LORI J. GROVEN is an Assistant Professor for the Department of Chemical and Biological Engineering at South Dakota School of Mines and Technology. Prior to this appointment she served as an Assistant Research Faculty in the School of Mechanical Engineering at Purdue University, West Lafayette, IN. She is an experimentalist focused on the combustion, characterization, processing, and improvement of materials ranging from traditional materials to the nanoscale for propulsion and energy storage. Her research has included the study of combustion of nanosized powders to synthesize intermetallic and ceramic materials, small scale propagation of gasless reactions, direct write of biocidal materials, and most recently has focused on additive manufacturing routes for energetic materials, to name a few. She is the author or co-author of more than 30 peer reviewed publications since 2010.



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