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Nano-Al Based Energetics: Rapid Heating Studies and a New Preparation Technique KYLE SULLIVAN, JOSH KUNTZ, ALEX GASH, Lawrence Livermore National Laboratory, MICHAEL ZACHARIAH, University of Maryland — Nano-Al based thermites have become an attractive alternative to traditional energetic formulations due to their increased energy density and high reactivity. Understanding the intrinsic reaction mechanism has been a difficult task, largely due to the lack of experimental techniques capable of rapidly and uniform heating a sample ($\sim 10^4$ – 10^8 K/s). The current work presents several studies on nano-Al based thermites, using rapid heating techniques. A new mechanism termed a Reactive Sintering Mechanism is proposed for nano-Al based thermites. In addition, new experimental techniques for nanocomposite thermite deposition onto thin Pt electrodes will be discussed. This combined technique will offer more precise control of the deposition, and will serve to further our understanding of the intrinsic reaction mechanism of rapidly heated energetic systems. An improved mechanistic understanding will lead to the development of optimized formulations and architectures. This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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