Abstract Submitted
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Engineering Surface Properties of Reactive Materials RICHA PADHYE, Texas Tech University — The effect of processing liquids on particle surface hydration and subsequent reactivity of mixtures containing aluminum (Al) with different oxidizing agents was investigated. Processing mixtures of Al and PTFE using a non-polar liquid limited surface hydration and produced significantly lower reactivity than the same mixture processed in a polar liquid. This understanding has been extended toward assessing the influence of processing liquid on reactivity of Al with other oxidizing agents, specifically CuO and MoO3. Al+CuO showed no difference in reactivity as a function of processing liquid. But MoO3 was shown to be more hydration sensitive than CuO and the added water concentration in the overall mixture aided combustion and increased the flame speed when compared to Al+MoO3 processed in a non-polar liquid. To better comprehend this behavior, density functional theory (DFT) calculations were performed to understand molecular variations on an alumina surface. The analysis has strong implications for the reactivity of aluminum (Al) particles passivated by an alumina shell.

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