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**The effects of fluid turbulence on metal vapor nucleation** JUN LIU, SEAN GARRICK, University of Minnesota -Twin Cities — The rising need for clean, renewable energy sources has led to recent studies on hydrogen production via hydrolysis of zinc nanoparticles. Aerosol or gas-phase processes are favored in many industrial applications due to its advantage in controlling particle size distribution and the resultant chemical conversion. The rising need for clean, renewable energy sources has led to recent studies on hydrogen production via hydrolysis of zinc nanoparticles. Aerosol or gas-phase processes are favored in many industrial applications due to its advantage in controlling particle size distribution and the resultant chemical conversion. In this work we study the formation of metal particles in a shear flows. Direct numerical simulation of homogeneous metal vapor nucleation in laminar and turbulent flows are performed for a variety of metals. The flows consist of hot metal vapor issuing into cooler inert gas. As the metal vapor cools, nanoparticles form and are transported throughout the flow-field. Homogeneous nucleation is simulated using classical nucleation theory and two approaches to representing the surface tension. The effects of three-dimensional turbulent mixing are also analyzed. The results suggest that fluid, thermal and species mixing greatly affects the nucleation dynamics. We report on the effects of vapor concentration level, fluid mixing, and particle surface tension on the conversion from metal vapor to metal nanoparticles.

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