

Abstract Submitted  
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**Molecular Dynamics Investigations of the Ablator/Fuel Interface during Early Stages of Inertial Confinement Fusion<sup>1</sup>**

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At the National Ignition Facility, high-powered laser beams are used to compress a small target to generate fusion reactions. A critical issue in achieving this is the understanding of mix at the ablator/fuel interface. Mixing occurs at various length scales, ranging from atomic inter-species diffusion to hydrodynamic instabilities. Because the interface is preheated by energy from the incoming shock, it is important to understand the dynamics before the shock arrives. The interface is in the warm dense matter phase with a deuterium/tritium fuel mixture on one side and a plastic mixture on the other. We would like to understand various aspects of the evolution, including the state of the interface when the main shock arrives, the role of electric field generation at the interface, and the character and time scales for diffusion. We present a molecular dynamics approach to model these processes, in which the ions are treated as classical point particles. Because we must reach extremely large length and time scales, we have also developed a simplified electronic structure model, which includes time- and space-dependent ionization levels, external heating and electron-ion energy exchange. Simulation results are presented and compared with other models and experiments.

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