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Diffusion-dominated mix observed through high spatial resolution separated reaction mix experiments[1] KEVIN MEANEY, YONGHO KIM, WILLIAM TAITANO, Los Alamos National Laboratory, ALEX ZYLSTRA, Lawrence Livermore National Laboratory, ALEX LEATHERLAND, Atomic Weapons Establishment, HANS HERRMANN, NELS HOFFMAN, HERMANN GEPPERT-KLEINRATH, Los Alamos National Laboratory — In inertial confinement fusion, high-Z material mixed into the fuel degrades implosions, dulling ignition. Mix is often understood to be primarily fluid instabilities (Rayleigh Taylor, Richtmyer-Meshkov) and has been benchmarked by separated-reactant experiments. New higher spatial resolution separated-reactant target (150 nm deuterated layer instead of a 2 μm layer) experiments coupled with nuclear diagnostics - neutron time-of-flight and time-resolved gamma-ray diagnostics - reveal a more complex shell-to-fuel mix landscape. Recent implosion experiments at OMEGA Laser Facility reveal that the dominant mix mechanism is diffusion even for a moderate temperature (6 keV) and convergence (10), which were traditionally understood with a hydrodynamic mix width. Supporting Fokker-Planck simulations capture the species specific ion movement independent of fluid instability growth. The thinner reactant layer helps inform the transition to the canonical hydrodynamic mix. Understanding the interplay between diffusion and standard mix mechanisms gives insight into the regimes kinetic effects plays an important role for inertial confinement fusion evolution.

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