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Electron Shock Ignition R. BETTI, R. NORA, K.S. ANDERSON, M. LAFON, W. THEOBALD, R. YAN, C. REN, Fusion Science Center and Laboratory for Laser Energetics, U. of Rochester — Shock ignition uses a late strong shock to ignite the hot spot of an inertial confinement fusion (ICF) capsule. In the standard shock-ignition scheme, the shell is driven at a relatively slow velocity of about 250 km/s and an ignitor shock with an initial pressure $\geq$300 Mbar is launched by the ablation pressure from a spike in laser intensity. Recent experiments on OMEGA have shown that focused beams with intensity up to 8×10^{15} W/cm^2 can produce copious amounts of hot electrons. The hot electrons are produced by laser–plasma instabilities (LPI's) (such as stimulated Raman scattering and two-plasmon decay) and can carry up to $\sim$15% of the laser energy. NIF-scale targets will likely produce even more hot electrons because of the large plasma scale length. We show that it is possible to design ignition targets with implosion velocities as low as 100 km/s that are shock ignited using LPI-generated hot electrons to raise the pressure of the shell up to 2 to 3 Gbar just before stagnation. These targets feature a mid-Z layer designed to stop the hot electrons up to temperatures of 200 keV. The gigabar pressures in the heated mid-Z layer drive a multigigabar shock in the hot spot, igniting it with a significant margin. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and DE-FC02-04ER54789 (Fusion Science Center).

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