Abstract Submitted
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Quantitative Radiography for Inertial Confinement Fusion (ICF) Capsule Metrology[1] HAIBO HUANG, RICHARD STEPHENS, ABBAS NIKROO, SAM EDDINGER, HONGWEI XU, K.C. CHEN, KARI MORENO, General Atomics, BERNARD KOZIOZIEMSKI, LLNL — Film-based radiography can be accurate enough to satisfy the demanding requirements in ICF capsule metrology. We (1) built a precision digitizer to non-destructively resolve the structures in an ICF capsule with sub-micron resolution and (2) developed a film model to measure the impurity elements in each layer to better than a fraction of an atomic percent. We achieved submicron dimension measurement accuracy by developing a wave propagation model and physical standards to calibrate the offsets due to X-ray diffraction and lens distortion, and an edge detection routine to mitigate film noises. We also developed a quantitative film model to measure the Cu or Ge dopant concentration profiles in ICF capsules to better than 0.1 atomic percent, with the results in agreement with those from destructive techniques. The technique can estimate the hard-to-measure oxygen which is valuable to process development. Furthermore, it can be useful as a quality control tool to cap the maximum tolerable impurity levels.

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