

Abstract Submitted  
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**Dynamic Ellipsometry Under Extreme Conditions**<sup>1</sup> JEFFREY H. NGUYEN, JEREMY R. PATTERSON, NEIL C. HOLMES, Lawrence Livermore National Laboratory — Accurate temperature measurements at high temperatures and pressures require knowledge of emissivities at similar conditions. Presently, many temperature measurements at extreme conditions assume a constant ambient-condition emissivity. Development of a miniaturized ellipsometer has made it possible to measure optical properties, and thus emissivities, of materials under extreme shock conditions. We will present here past development and future directions of the miniaturized ellipsometer for use in high pressure- high temperature experiments. We will also discuss applications of the technique including phase transitions under dynamic compression, observed changes in the complex dielectric constants of various solids and water. Since emissivity can be determined from the complex dielectric constants, we expect emissivity to change upon phase transition. We will present here results on various solid-solid, solid-liquid and liquid-solid phase transitions. In particular, we will focus on the change in emissivity at the  $(\alpha, \epsilon)$  phase boundary in Fe and its implications for the Fe phase diagram.

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