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Shock Compression Experiments with in situ Ellipsometry Measurements LIOR BAKSHI, Mechanical Engineering Department, Ben Gurion University, Beer Sheva 84105, Israel, SHALOM ELIEZER, NOAZ NISSIM, LIOR PERELMUTTER, MORIS SUDAI, Soreq NRC, Yavne 81800, Israel, MICHAEL MOND, Mechanical Engineering Department, Ben Gurion University, Beer Sheva 84105, Israel — Knowledge about the optical properties of materials at high pressure and high temperature is needed for EOS research. Ellipsometry measures the change in the polarization of a probe beam reflected from a surface. From the change in polarization, the real and imaginary parts of the time dependent complex index of refraction can be extracted. From the measured optical properties, fundamental physical properties of the material, such as emissivity, phase transitions, and electrical conductivity can be extracted. A dynamic ellipsometry measurement system with nanosecond resolution was built in order to measure all four stocks parameters. Gas gun was used to accelerate the impact flyer. Our experiments concentrated on the optical properties of 1020 steel targets with impact pressure range of 40-250 kbar. Free surface measurements as well as window-target interface measurements were preformed. Although there are intrinsic difficulties with dynamic ellipsometric measurements, distinct changes were observed for shock wave pressures larger than 130kbar, the $\alpha \rightarrow \varepsilon$ phase transition.

Lior Bakshi
Mechanical Engineering Department, Ben Gurion University,
Beer Sheva 84105, Israel

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