Abstract Submitted
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Multi-Megabar pressure and super-dense materials created byinduced micro-explosion inside of transparent solid EUGENE GAMALY, Australian National University, Canberra, Australia, SAULIUS JOUDKAZIS, HIROAKI MISAWA, Hokkaido University, Sapporo, Japan, BARRY LUTHER-DAVIES, ANDREI RODE, Australian National University, Canberra, Australia, LUDOVIC HALLO, PHILIPPE NICOLAI, VLADIMIR TIKHONCHUK, Universite Bordeaux1, France — High pressure and temperature have been produced using a single laser pulse (100 nJ, 800 nm, 200 fs) focused inside transparent dielectrics [1,2]. The laser pulse converts a material within the volume of $\sim$ 0.15 μm^3 into plasma in a few fs time. A pressure of $\sim$10 TPa builds up generating strong shock and rarefaction waves and creating a nano-void surrounded by shell of compressed material. Analysis of the size of the void and the shell as a function of laser energy revealed that shell has a density 1.14 times of sapphire. High-density sapphire completely dissolves in 10% solution of hydrofluoric acid while pristine sapphire remains intact. The unique conditions created– pressure of 10 TPa, temperature of 5x10^{5}K, record high heating and cooling rates of 10^{18} Kelvin/s open an exciting research field for studying matter at extreme in well-controlled laboratory environment.
[1] S. Joudkazis et al, PRL, 96,166101 (2006).. E. Gamaly et al PRB, **73**, 214101 (2006).

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