Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Homoepitaxial Boron Doped Diamond Anvils as Heating Elements in a Diamond Anvil Cell JEFFREY MONTGOMERY, GOPI SAMUDRALA, SPENCER SMITH, GEORGIY TSOI, University of Alabama at Birmingham, YOGESH VOHRA, Spencer J Smith ¡sjs605@uab.edu¿, SAMUEL WEIR, Lawrence Livermore National Laboratory — Recent advances in designer-diamond technology have allowed for the use of electrically and thermally conducting homoepitaxially-grown layers of boron-doped diamond (grown at 1200 °C with a 2% mixture of CH_4 in H, resulting in extremely high doping levels $\sim 10^{20}/\mathrm{cm}^3$) to be used as heating elements in a diamond anvil cell (DAC). These diamonds allow for precise control of the temperature inside of the diamond anvil itself, particularly when coupled with a cryostat. Furthermore, the unmatched thermally conducting nature of diamond ensures that no significant lateral gradient in temperature occurs across the culet area. Since a thermocouple can easily be attached anywhere on the diamond surface, we can also measure diamond temperatures directly. With two such heaters, one can raise sample temperatures uniformly, or with any desired gradient along the pressure axis while preserving optical access. In our continuing set of benchmark experiments, we use two newly created matching heater anvils with 500μm culets to analyze the various fluorescence emission lines of ruby microspheres, which show more complicated behavior than traditional ruby chips. We also report on the temperature dependence of the high-pressure Raman modes of paracetamol ($C_8H_9NO_2$) up to 20 GPa.

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Date submitted: 14 Nov 2012 Electronic form version 1.4