

## Ultra high pressure generation using the double-stage diamond anvil cell

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1 TPa region is still far frontier for the high pressure physics. The maximum pressure generated by diamond anvil cell is about 400 GPa (Akahama and Kawamura, 2010). On the other hand, recently Dubrovinsky et al. (2012) reported the generation of 640 GPa using double stage diamond anvil cell. This new technique makes 1TPa region a realistic goal for static compression experiments. But there are some technical difficulties such as a second-stage anvil's shape controllability, shift under pressure, and the difficulty of a sample filling. These problems depress the reproducibility of experiment.

In this study, second-stage microanvils were made by focused ion beam system from the nano-polycrystalline diamond (NPD) or single crystal (SC) diamond. Micro manufacturing using focused ion beam system enables us to control anvil shape, process any materials (NPD, SC and also sample), and fill the sample between the second-stage anvil gap precisely. Using this method, we generated up to 340 GPa. This method has a high reproducibility of the experiment. Thus, we can optimize the experimental parameters such as an anvil shape, confining pressure and so on.

Keywords: nano-polycrystalline diamond (NPD), microanvil