Hexagonal Diamond from Highly Crystalline Graphite Film

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While a compressed graphite transforms to a cubic diamond under high-temperature condition, a high crystalline graphite transforms to a hexagonal diamond under ambient temperature condition. The transition pressure is much affected by the nature of the sample and the compression procedure [1].

We investigated the transition pressure with a highly crystalline graphite film made from a heat-treated poly-imide by Raman spectroscopy and X-ray diffractometry. High pressure was generated by a diamond-anvil cell and Daphne7373 oil was used as a pressure transmitting medium. In Raman spectroscopy, the peaks associate with the hexagonal diamond appeared at 6 GPa and the graphite peaks vanished at 9 GPa. The transition pressure is found to be much lower than that of the previous report. On the other hand, in X-ray diffraction experiment, the transition was detected not at 6 GPa but at 19 GPa same as the previous report [2]. We propose that the transition firstly occurs on the surface at much low pressure with highly crystalline graphite film.

[1] Yagi T., et al., *Phys. Rev. B*, 1992, **46**, 6031. [2] Utsumi W., Yagi T., *Science*, 1991, **252**, 1542.

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