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Cold compressed graphite – A revisit YUE MENG, HPCAT, Carnegie Institution of Washington, PRZEMEK DERA, GSECARS, University of Chicago and Hawaii Institute of Geophysics and Planetology, University of Hawaii, GUOYIN SHEN, HPCAT, Carnegie Institution of Washington — Phase transition in cold compressed graphite has been a paradox for several decades. Although a pressure-induced phase change is certainly supported by several lines of experimental evidence, the nature of the change as well as the pressure range of the transition remain unsettled. X-ray diffraction studies have revealed a graphite to hexagonal diamond transition in the pressures from 11 to 25 GPa [1] and recently a graphite to M-carbon transition from 19 to 37 GPa [2]. A transition from graphite-like carbon to an amorphous state was reported based on Raman observations [3]. Several post-graphite structures have also been predicted in recent theoretical studies [4,5]. Here we report x-ray diffraction studies on cold compressed polycrystalline and single crystal graphite samples to above 30 GPa. Instead of the transformation to the hexagonal diamond or M-carbon, we observed a transition from graphite to an amorphous carbon. Our results together with the previous studies point to the importance of the starting material characterization, as well as pressure environment control in the study of phase transition in cold-compressed graphite.

[1] T. Yagi et al. (1992)
[2] Y Wang et al. (2012)
[3] AF Goncharov (1991)
[4] H. Niu et al. (2012)
[5] Amsler et al. (2012)

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