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Shear-induced phase transition of disordered nanocrystalline hexagonal boron nitride at room temperature[1] CHENG JI[2], Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439, USA, VALERY LEVITAS, Department of Aerospace Engineering, Mechanical Engineering, and Material Science Engineering, Iowa State University, Ames, Iowa 50011, USA, HONGYANG ZHU, State Key Laboratory of Superhard Materials, Jilin University, Changchun 130012, Jilin, PR China, JHARNA CHAUDHURI, ARCHIS MARATHE, YANZHANG MA, Department of Mechanical Engineering, Texas Tech University, Lubbock, Texas 79409, USA — Disordered hexagonal boron nitride (hBN) is an important precursor material for the synthesis of super-hard materials, wurtzitic BN (wBN) and cubic BN. However, the phase transformations from disordered hBN were only achieved at high temperatures under high pressures. By applying large shear by rotational diamond anvil cell, we observed the phase transition from disordered nanocrystalline hBN to wBN at room temperature under a moderate pressure of 6.7 GPa. Yet, under hydrostatic compression to 52.8 GPa, the same hBN sample did not transform to wBN. Our results demonstrate a potential of low pressure-room temperature synthesis of super-hard materials under plastic shear from disordered or amorphous precursors.

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[2]Also at High Pressure Synergetic Consortium, Carnegie Institution of Washington, Argonne, IL 60439, USA.

Cheng Ji
Argonne National Laboratory

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