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Microstructure and spectroscopy studies on cubic boron nitride synthesized under high-pressure conditions

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Abstract. High-resolution electron microscopy (HREM) studies of the microstructure and specific defects in hexagonal boron nitride (h-BN) precursors and cubic boron nitride (c-BN) crystals made under high-pressure high-temperature conditions revealed the presence of half-nanotubes at the edges of the h-BN particles. Their sp^3 bonding tendency could strongly influence the nucleation rates of c-BN. The atomic resolution at extended dislocations was insufficient to allow us to determine the stacking fault energy in the c-BN crystals. Its mean value of 191 ± 15 mJ m^{-2} is of the same order of magnitude as that of diamond. High-frequency (94 GHz) electron paramagnetic resonance studies on c-BN single crystals have produced new data on the D1 centres associated with the boron species. Ion-beam-induced luminescence measurements have indicated that c-BN is a very interesting luminescent material, which is characterized by four luminescence bands and exhibits a better resistance to ionizing radiation than CVD diamond.

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