

High Pressure Synthesis of B-C-N Crystal

Keywords : Superhard materials, Wide-bandgap materials

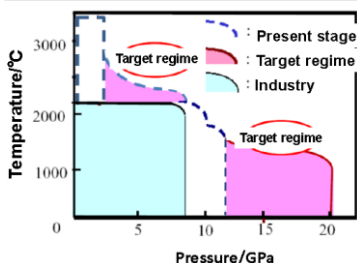
Back-ground

Applying pressure as a parameter for materials synthesis may have benefit to obtain high dense phase, high purity materials and newly functionalize materials. In order to realize these benefits, technical development of high pressure study is the key issue.

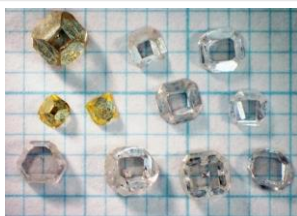
Aim

Synthesis of high quality Boron Nitride and Diamond crystals/sintered bodies were studied up to 10GPa and 2000Y region so far. The next issue will involve to realize highly crystalline state of these alloy system(B-C-N) by means of development of high pressure technology.

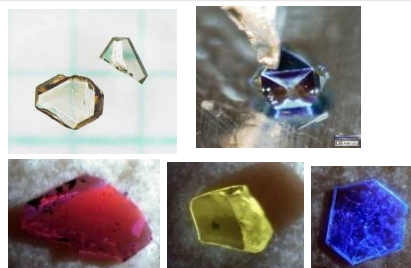
Advanced Research Topics



Target of NIMS Belt apparatus



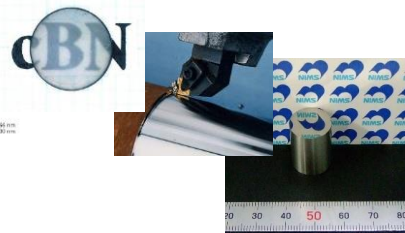
Diamond single crystals



Cubic Boron Nitride (cBN) single crystals



Hexagonal BN(hBN) crystals for 2D device application



High purity cBN sintered body for precision cutting tools

Publications

- T.Taniguchi, "Synthesis and Properties of Single Crystalline cBN and Its Sintered Body" COMPREHENSIVE HARD MATERIALS 3 (2014) 587-605.
- T.Taniguchi, "High-Pressure Synthesis of Binderless Cubic Boron Nitride Sintered Bodies" Rev.High Pressure Sci and Technology, 21[4] (2012) 292-299.

Applied area and future prospects

- Synthesis of high quality cBN sintered bodies and their application for precision cutting
- Synthesis of high quality hBN single crystals and their application for far UV light emitter and substrate for 2D electric devices (i.e.graphene)

Issues for technology transfer

- Achievement of precision cutting technology for ferrous materials
- Development of far UV light emitting device to replace mercury lamp
- Development of insulating substrate/ gate materials for 2D electron devices (i.e.graphene)



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