Impurity control of 2D- / 3D- Boron Nitride crystals 
and their functionalization

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Hexagonal BN (hBN) and cubic BN (cBN) are known as the representative crystal structures of BN. The former is chemically and thermally stable, and has been widely used as an electrical insulator and heat-resistant materials. The latter, which is a high-density phase, is an ultra-hard material second only to diamond. Some progresses in the synthesis of high purity BN crystals were achieved by using Ba-BN as a solvent material at high pressure crystal growth [1]. Band-edge natures (cBN Eg=6.2eV and hBN Eg=6.4eV) were characterized by their optical properties. The key issue to obtain high purity crystals is to reduce oxygen and carbon contamination in the growth circumstances. It should be emphasized that hBN exhibits attractive potential for deep ultraviolet (DUV) light emitter [2,3] and also superior properties as substrate of graphene devices.

In this presentation, recent trials for high quality hBN, cBN crystals growth by using flux process under high pressure will be introduced.

After somehow achieved to obtain high purity crystals, artificial doping to realize new function should be a next important step. The study for rare earth element doping in cBN and their characterization by ultimate analysis and ab-initio study will be also introduced.