Hexagonal boron nitride

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Hexagonal boron nitride (hBN) is an ultrawide bandgap semiconductor with a large range of basic applications relying on its low dielectric constant, high thermal conductivity, and chemical inertness. The growth of high-quality crystals in 2004 [1] has completely renewed interest in hBN. In the context of 2D materials research, hBN is used as an ideal 2D insulator, an excellent substrate for graphene and the best barrier material in van der Waals heterostructures. hBN is also emerging as an exciting material in its own right, offering novel material properties that enable a broad range of optical, electro-optical and quantum optics functionalities in various spectral domains. It is a natural hyperbolic material in the mid-infrared range, it hosts defects that can be engineered to obtain room-temperature, single-photon emission in the ultraviolet, visible and near-infrared ranges, and it exhibits exceptional performances in the deep-ultraviolet for a new generation of emitters and detectors in the UV-C.

In this talk, I will review the original properties of hBN in relation with its lamellar structure, with some illustrations in fundamental studies and applications.

References

[1] K. Watanabe, T. Taniguchi, and H. Kanda, Nature Mater. **3**, 404 (2004).