

Consolidated nano-polycrystalline diamond and its potential applications to deep-Earth drilling

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We have been developing technology to synthesize ultrahard nano-polycrystalline diamond (NPD = HIME-DIAMOND), using multianvil high-pressure technology. Now, we are able to make such NPD rods with dimensions of up to 1 cm in both diameter and length on a routine basis. NPD is known to have exceptional hardness and toughness, which withstands even high temperatures exceeding 1300K. Here, I will report current status of the synthesis, properties, and some applications of NPD. NPD should also be potentially important as a drilling tool, because of its ultrahardness and high toughness at high temperature, which are far superior to those of conventional hard materials such as tungsten carbide or sintered polycrystalline diamond with some binders.

Keywords: ultrahard material, diamond, polycrystalline material, deep Earth drilling, mantle, high pressure

