CHARACTERISTICS OF c-BN/DIAMOND BI-LAYERED COATINGS

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Cubic boron nitride (c-BN) has been coated on vapor-deposited diamond films. Such bi-layered structure provides the possibilities to fully utilize the unique advantages of the material of each layer, which are complementary to each other. To generate insight into the growth mechanisms of c-BN on diamond films, the phase evolution in the interfacial region between c-BN and diamond has been characterized by high resolution transmission electron microscopy. Relatively thick transition layers at c-BN/diamond interfaces have been observed. This can be attributed to rough surfaces and tensile stress in the diamond films. In addition, thermal oxidation resistance of the c-BN overlayers has been evaluated. It is shown that although c-BN has a high chemical stability, the excessive boron in the films and the transition layers at c-BN/diamond interfaces will react with the air, resulting in a poor thermal oxidation resistance. Moreover, the degradation of the films can induce volume change and the consequent residual stress.