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Crystallite structure of diamond-silicon carbide composites as a function of sintering temperature STEPHEN NAUYOKS, TCU, L. BALOGH, ELTE, T.W. ZERDA, TCU — Because diamonds possess many key physical properties, e.g. high hardness and wear resistivity, they are often used in industrial applications. Diamond powder could be sintered with a binding phase to form large volume diamond composites. These diamond composites have a very high hardness and wear resistance, but have relatively low fracture toughness. It has been shown that the use of nano-diamonds in composites has greatly increased the fracture toughness with a minimal decrease in hardness. Silicon-carbide has a high fracture toughness and is often used as a binding phase in diamond composites. Nano-size diamond-SiC composites were sintered under high pressure, high temperature conditions. The crystallite size, stacking fault probability, and dislocation density were determined from x-ray diffraction profiles. It was found that crystallite size increases; while dislocation density and stacking fault probability decreased as sintering temperature increased. These results were confirmed with high resolution TEM images.

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