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[54] METHOD FOR FABRICATING DIAMOND FILMS ON NONDIAMOND SUBSTRATES AND RELATED STRUCTURES

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[57] **ABSTRACT**

A method for making an oriented diamond film includes the steps of seeding a face of a nondiamond substrate with diamond particles, and orienting the diamond particles with respect to the substrate by heating the seeded substrate to a predetermined temperature and for a predetermined time to dissolve portions of the diamond particles into the substrate while suppressing graphite formation. Diamond may then be deposited onto the oriented diamond particles by CVD techniques to thereby form an oriented diamond film on the nondiamond substrate. The nondiamond substrate is preferably a single crystal transition metal capable of dissolving carbon. The transition metal is preferably selected from the group consisting of nickel, cobalt, chromium, magnesium, iron, and alloys thereof. For nickel as the substrate material, the temperature for orientation of the diamond particles is preferably about 1200° C., for a time period in the range of about 1 to 15 minutes, and, more preferably, about 1 to 5 minutes. Structures produced by the method are also disclosed and include the absence of a graphite layer between the diamond and the nondiamond substrate.

50 Claims, 6 Drawing Sheets

