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Sintering, consolidation, reaction and crystal growth by the spark plasma system (SPS)

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Abstract

The graphite die set in spark plasma system (SPS) is heated by a pulse direct current. Weak plasma, discharge impact, electric field and electric current, which are based on this current, induce good effects on materials in the die. The surface films of aluminum and pure WC powders are ruptured by the spark plasma. Pure AlN powder is sintered without sintering additives in the electric field. The spark plasma leaves discharge patterns on insulators. Organic fibers are etched by the spark plasma. Thermosetting polyimide is consolidated by the spark plasma. Insoluble polymonomethylsilane is rearranged into the soluble one by the spark plasma. A single crystal of CoSb_3 is grown from the compound powders in the electric field by slow heating. Coupled crystals of eutectic powder are connected with each other in the electric field.



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Keywords

Spark plasma system; Spark plasma sintering; Plasma activated sintering; Discharge; Electric field; Discharge impact; Skin current; Sintering; Consolidation; Chemical reaction; Crystal growth

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