

## **A Novel Process for Fabricating Boron Carbide-Copper Cermets (BGN)**

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**T**his novel invention presents a cost effective process for the fabrication of ceramics packed with metal. These cermet composites are based on Boron Carbides with infiltrated copper. The process addresses the design of B<sub>4</sub>C and Cu cermets with two interpenetrating and interconnected networks of B<sub>4</sub>C and Cu, respectively. The infiltration of copper into the boron carbide cermet yields a unique combination of properties that includes extreme hardness; high neutron absorption; ductility; electric and thermal conductivity. Pure boron carbides B<sub>4</sub>C are used for neutron absorption in Liquid-Metal-Cooled Fast Breeder Reactors. However, their use as building blocks for fusion reactors panels is limited since their brittleness causes neutron irradiation difficulties. This novel B<sub>4</sub>C and Cu combined cermet presents an efficient solution for applications that involve heat conduction, neutron absorption and mechanical ductility.

### **Benefits**

A high quality material of extreme hardness (almost diamond equivalent).

Ductility enabling forming of structural components.

Neutron absorption. Enabling usage as a shielding material for nuclear waste.

Heat and electricity conductivity.

Full infiltration of a partly sintered B<sub>4</sub>C by molten Cu at temperatures B<sub>4</sub>C and Cu easily attained by conventional equipment.

### **Potential Commercial Uses and Strategic Partners**

The cermets may be used for the covering of polluting and hazardous material such as atomic reactors waste and as neutron absorbing media in atomic reactors.


### **Development Stage and Development Status Summary**

Sample blocks were fabricated at Ben-Gurion University laboratory and are available for further tests and demonstrations.

### **Patent Status**

Patent pending

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