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

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This novel invention presents a cost effective process for the fabrication of ceramics packed with metal. These cermets composites are based on Boron Carbides with infiltrated copper. The process addresses the design of B4C and Cu cermets with two interpenetrating and interconnected networks of B4C 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 B4C 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 B4C 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 B4C by molten Cu at temperatures B4C 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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