

TABLE II-continued

Formulation	Density (g/cc)	Bending Strength (kg/mm <sup>2</sup> )	Specific Strength (kg/mm <sup>2</sup> )/(g/cc)
II-B	2.25	24.9	11.1
III	2.30	31.5	13.7
III-A	2.31	32.9	14.3
III-B	2.31	30.0	12.9
IV	2.26	26.6	11.8
IV-A	2.26	31.1	13.8
IV-B	2.26	21.9	9.7

## EXAMPLE XII

Determination of Ingredient Ratio Effect Six test specimens were formed from each of Formulations V-A, VI-A, VII-A, and VIII-A by the molding procedure of Example VIII and the pyrolysis procedure of Example X, equilibrated in air, and tested for bending strength as in Example X; and a duplicate run was made on Formulation VII-A. The as-pyrolyzed densities and average bending strengths of the specimens are shown in Table III.

TABLE III

Formulation	Density (g/cc)	Bending Strength (kg/mm <sup>2</sup> )
V-A	2.21	22.3
VI-A	2.28	27.1
VII-A	2.26	30.7
VII-A	2.26	27.9
VIII-A	2.23	26.2

## EXAMPLE XIII

## Determination of SiC Particle Size Effect

To determine if the particle size of the SiC starting material had an effect on the strength of pyrolyzed specimens, Formulation IX-A was molded into green disc specimens as in Example VIII and pyrolyzed as in Example X except that the heating rate from 60° C. to 260° C. was reduced to 15° C./hour, after which the pyrolyzed discs were equilibrated in air and tested for bending strength as in Example X. The SiC ceramic discs had an as-pyrolyzed density of about 2.12 g/cc and an average bending strength of 17.6 kg/mm<sup>2</sup>—a strength high enough to make them useful but not as high as the strengths of ceramics derived from formulations containing SiC powders of a smaller particle size.

## EXAMPLE IX

## Determination of Effect of Degassing

Six green discs of Formulation X-A were compression molded as in Example VIII, and another six discs were molded from the same formulation under the same conditions except that no vacuum was applied to the mold prior to and during compression of the formulation powder. (Instead, the mold was sealed under dry nitrogen atmosphere and left sealed during compression.) The molded specimens were pyrolyzed, equilibrated in air, and tested for bending strength as in Example X. The SiC ceramics made from the green discs that were vacuum degassed prior to and during com-

pression molding had an as-pyrolyzed density of 2.27 g/cc and an average bending strength of 25.2 kg/mm<sup>2</sup>, while the discs that were not vacuum degassed had an as-pyrolyzed density of 2.28 g/cc and an average bending strength of 17.4 kg/mm<sup>2</sup>.

It is obvious that many variations can be made in the products and processes set forth above without departing from the spirit and scope of this invention.

What is claimed is:

1. A molded SiC ceramic having a density of about 2.0-2.4 g/cc and a specific strength of at least 14 (kg/mm<sup>2</sup>)/(g/cc) which is derived from a preceramic composition consisting essentially of an intimate mixture of (A) about 50-85% by weight of SiC powder and (B) about 15-50% by weight of a preceramic polysilazane binder.

2. The ceramic of claim 1 wherein the binder of the preceramic composition consists essentially of at least one polysilazane prepared by reacting an organodihalosilane with ammonia, treating the ammonolysis product with a basic catalyst which is capable of deprotonating an NH group that is adjacent to a SiH group, and quenching the resultant product with an electrophilic quenching reagent.

3. The ceramic of claim 1 wherein the binder of the preceramic composition constitutes about 20-30% of its weight.

4. A process for preparing a ceramic which comprises (A) intimately mixing about 50-85% by weight of SiC powder with about 15-50% by weight of a preceramic polysilazane binder, (B) pulverizing and sieving the mixture to provide a preceramic composition having a particle size not larger than about 105 micrometers, (c) molding the preceramic composition at a temperature of about 60-225° C., and (D) pyrolyzing the molded composition in an inert atmosphere to a temperature of about 1200-1450° C.

5. The process of claim 4 wherein the preceramic composition is degassed by the application of vacuum before and during molding.

6. The process of claim 4 wherein the pyrolysis is accomplished by heating the molded composition to 1300° C. at rates of 60° C./hour from room temperature to 60° C., 30° C./hour from 60° C. to 260° C., 120° C./hour from 260° C. to 1260° C., and 60° C./hour from 1260° C. to 1300° C., maintaining the temperature at 1300° C. for one hour, and cooling.

7. The process of claim 4 wherein the binder consists essentially of at least one polysilazane prepared by reacting an organodihalosilane with ammonia, treating the ammonolysis product with a basic catalyst which is capable of deprotonating an NH group that is adjacent to an SiH group, and quenching the resultant product with an electrophilic quenching reagent.

8. The process of claim 7 wherein the binder content of the preceramic composition is about 20-30% by weight.

9. The process of claim 7 wherein the binder has an alkali metal content of 0-100 ppm.

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