unidirectionally laid fibers in all layers are oriented in substantially the same axial direction (±5°).

Based on the composition of the matrix material, the particular fiber reinforcement, and the process of forming the composite, an article with exceptional high strength, fracture toughness, and oxidation resistance especially at high temperatures is obtained. Each continuous fiber reinforced layer of the composite, regardless of the number of layers or orientation, has an axial flexural strength greater than 80,000 psi and, in most instances, greater than 100,000 psi. As for fracture toughness, although specific fracture toughness measurements have not been made on the composites of the present invention, it is anticipated that each layer will have a critical stress intensity factor (K_{IC}) greater than $10\times 10_3$ psi $\sqrt{in}$. This is clearly superior to any known ceramic material currently available and, with the high temperature strength and oxidative stability of the composites of the present invention, is superior at temperatures greater than 1000° C. than similar glass, glass-ceramic, or ceramic composites not containing reaction-inhibiting Nb and/or Ta ions.

It is particularly noteworthy that, even after initial fracture, composites of the present invention retain a substantial fraction of their original untested strength. This resistance to fracture, even in the presence of initiated damage, is distinctly different from the brittle nature of conventional ceramic articles.

The reinforced ceramics of the present invention have particular utility in environments where oxidation resistance, high strength, and toughness are required, and, because those properties are retained in a high temperature environment (e.g., in excess of 1000° C. and even in excess of 1200° C.), the inventive composites are eminently suitable for use in such applications as a gas turbine engine or internal combustion engine environment, and in high temperature structural ceramic components.

Although this invention has been shown and described with respect to detailed embodiments thereof, it will be understood by those skilled in the art that various changes in form and detail thereof may be made without departing from the spirit and scope of the claimed invention.

We claim:

1. A silicon carbide fiber reinforced glass-ceramic composite exhibiting use temperatures in excess of 1000° C. consisting essentially of about 15% to about 70% by volume silicon carbide fibers implanted within a glass-ceramic matrix consisting essentially of, expressed in terms of weight percent on the oxide basis, about

Li_2O	1.5-5
Al_2O_3	15-25
SiO_2	60-75
As_2O_3	0.5-3
Ta_2O_5	0-10
Nb_2O_5	0-10
Ta_2O_5 and/or Nb_2O_5	1-10
ZrO_2	1-3
MgO	0-10

said fibers having a reaction-inhibiting, diffusion barrier coating of niobium carbide and/or tantalum carbide thereon.

2. A composite according to claim 1 exhibiting use temperatures up to 1200° C., wherein Li_2O is present in an amount of 2-3.5%, and MgO is present in an amount of 1.5-6%.

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