

Claims

1. A method for the preparation of a composite article comprising aerogel particles and ceramic fibers, the method comprising:
providing a fibrous article comprising ceramic fibers,
providing an aerogel composition comprising an aerogel powder and an organic solvent,
combining the fibrous article and the aerogel composition, and
partially or completely removing the organic solvent to obtain the composite article.
2. The method for the preparation of a composite article according to claim 1, wherein the ceramic fibers contain 80 wt.-% or more of alumina, wherein the ceramic fibers contain less than 2 wt.-% of components other than silica and alumina, based on the total weight of the ceramic fibers.
3. The method for the preparation of a composite article according to claim 1, wherein the ceramic fibers contain 2 to less than 80 wt.-% alumina and 10 to 98 wt.-% of silica, based on the total weight of the ceramic fibers.
4. The method for the preparation of a composite article according to claim 1, wherein the ceramic fibers contain less than 2 wt.-% alumina, and contain 50 to 85 wt.-% silica and 15 to 50 wt.-% alkaline earth metal oxide.
5. The method for the preparation of a composite article according to any one of the preceding claims, wherein the organic solvent is a hydrocarbon solvent or an alcohol solvent or any mixture thereof.
6. The method for the preparation of a composite article according to any one of the preceding claims, wherein the aerogel is silica aerogel.

7. The method for the preparation of a composite article according to any one of the preceding claims, wherein the aerogel has a porosity of 85% or higher, as determined by isotherm adsorption and desorption.
8. The method for the preparation of a composite article according to any one of the preceding claims, wherein the aerogel has a specific surface area of 300 m²/g or higher, as determined by DIN ISO 9277 2003-05 (Determination of the specific surface area of solids by gas adsorption using the BET method).
9. The method for the preparation of a composite article according to any of the preceding claims, wherein the aerogel composition is a dispersion of the aerogel powder in the organic solvent, and the combined content of aerogel powder and organic solvent in the aerogel composition is 90 wt.-% or more, based on the total weight of the aerogel composition.
10. The method for the preparation of a composite article according to any one of the preceding claims, wherein the fibrous article and the aerogel composition are combined by injecting the aerogel composition into the fibrous article.
11. The method for the preparation of a composite article according to any one of the preceding claims, wherein the composite article contains 15 to 70 wt.-% aerogel based on the total weight of the composite article.
12. The method for the preparation of a composite article according to any one of the preceding claims, wherein at least 50% of the fibers in the composite article have a length of 10 mm or more.
13. The method for the preparation of a composite article according to any one of the preceding claims, wherein the weight ratio of the one or more aerogels to the one or more fibers (aerogel/fiber) in the composite article is 1:4 or higher.

14. A composite article comprising aerogel particles and ceramic fibers, wherein one or more of the following requirements (i) to (vii) are fulfilled:
- (i) the composite article contains less than 15% by weight organic compounds;
 - (ii) at least 50% of the fibers in the composite article have a length of 5 mm or more;
 - (iii) the composite article contains less than 10% by weight binder;
 - (iv) the composite article exhibits a total weight loss in thermogravimetric analysis (TGA) when being heated in a nitrogen atmosphere from 30°C to 1100°C with a temperature increase of 10 °C/min of less than 35% by weight;
 - (v) the weight ratio of the one or more aerogels to the one or more fibers (aerogel/fiber) in the composite article is 1:8 or higher;
 - (vi) the composite article has a burn-through time of 60 minutes or more, wherein the burn-through resistance is determined using the composite article in the form of a 30 cm x 30 cm sheet with a thickness of 13 mm and treating the composite article at the centre of its first major surface with a flame having a temperature of 1400°C, using a soldering torch, wherein the burn-through time is the duration from start of the flame treatment until the centre of the second major surface reaches a temperature of 1000°C;
 - (vii) when using the composite article in the form of a 20 cm x 50 cm sheet with a thickness of 13 mm and treating the composite article at the full surface of its first major surface in accordance with the ISO 834 temperature-time curve for 180 minutes, the centre of the second major surface has a temperature of less than 1000°C.
15. A composite article obtainable by the method according to any one of claims 1 to 13.