In view of the prior art, the present invention provides, i.a., ceramic fiber blankets with improved thermal insulation capability and temperature resistance at reduced costs.

The present inventors surprisingly found that this problem can be solved by incorporating aerogel into ceramic fiber blankets after the fiber blankets have been formed. This can be achieved by preparing an aerogel composition comprising an aerogel powder, a melamine-formaldehyde resin (which forms a crosslinked melamine resin after curing) and an organic solvent and injecting it into the fibrous blanket.

The present inventors surprisingly found that the thermal insulation capability also of glass-fiber blankets and melamine fiber blankets can be improved by incorporating aerogel.

In aerogel-incorporated materials it is generally desirable to use binders in order to structurally reinforce the aerogel-incorporated materials and bring versatile benefits, such as reduction of dust release and improvement of mechanical integrity. However, compatibility issue between the binders and the components in the aerogel dispersion, such as aerogel particles and solvent, exist. In such cases, aggregation of aerogel particles and/or coagulation of binder molecules may occur, and thus the blend dispersion containing aerogel particles and binders may not stay stable. Furthermore, the thermal decomposition issue of binders, in particular organic binders, represents a considerable problem for passive fire protection. If the heat release from the decomposition of binders is too high, the fire resistance of the aerogel-incorporated materials will be worsened. The present invention is, among others, based on the finding that melamine-formaldehyde resin can be used as a binder in such fibrous blankets without reducing the excellent suitability of these fibrous blankets for passive fire protection. It is to be understood that the references herein to "fibrous blankets" are not limited to the plural form thereof but also encompass the presences of a single "fibrous blanket".

Thus, in a first aspect, the present disclosure relates to a method for the preparation of a composite article comprising aerogel particles, a melamine resin and fibers, wherein the fibers are one or more selected from ceramic fibers, glass fibers and melamine fibers, the method comprising:

- providing a fibrous article comprising fibers, wherein the fibers are one or more selected from ceramic fibers, glass fibers and melamine fibers,
- providing an aerogel composition comprising an aerogel powder, a melamine-formaldehyde resin 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.

In another aspect, the present disclosure furthermore relates to a composite article obtainable by this method.

In addition, the disclosure relates to a composite article comprising aerogel particles, a melamine resin and fibers, wherein the fibers are one or more selected from ceramic fibers, glass fibers and melamine fibers, and wherein the composite article is obtainable by injecting or impregnating an aerogel composition comprising an aerogel powder, a melamine-formaldehyde resin and an organic solvent, and optionally inorganic opacifiers and/or mineral fillers, into a fibrous article comprising fibers, and partially or completely removing the organic solvent to obtain the composite article.

In still a further aspect, the present disclosure relates to a composite article comprising aerogel particles, a melamine resin and fibers, wherein the fibers are one or more selected from ceramic fibers, glass fibers and melamine fibers, and 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 other than the melamine resin;
(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 other than the melamine resin;
(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;