

# **AEROGELS: STRUCTURE, PROPERTIES AND APPLICATIONS**

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## Abstract

Aerogels prepared via a sol-gel route and supercritical drying possess a unique microstructure with specifics like a 3D open porous network of nanosized particles, huge specific surface area up to a few thousand square meters per gram, extremely low thermal conductivity, extremely low density, such that applications in a variety of industrial sectors seemed obvious 30 years ago.

The structure and properties are essentially independent of the chemical nature of the aerogels, which can be organic, inorganic, a combination of both or composites made from them. Although the large potential initiated intensive research it took almost twenty years before the still costly production process allows making aerogels finding their way into more and more industrial sectors. Aerogels are now utilized as super insulating materials in shoe soles or apparel, daylight illumination systems, pipeline isolation mats, medium temperature isolating materials, tennis rackets, drug delivery systems, foundry core and mould materials, building construction materials and many more are being developed in the last decade. The paper describes briefly typical aerogel structures, properties and then concentrates on a comprehensive presentation of industrial applications today and potential for the future.