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# A brief history and prospects of sodium silicate-based aerogel - a review

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## Abstracts

This review paper, *A Brief History and Prospects of Sodium Silicate-Based Aerogel*, aims to attract junior researchers and/or students interested in investing time and other resources to harness the overriding potential of silica aerogel. It will also invigorate the field experts for quick reference and areas of growth. This review provides solid evidence that the prospects for aerogel-based water treatment solutions and other potential applications are very optimistic than ever before. Early reports from the 1930s are reflected on, and current efforts are critically examined. Aerogel is a highly porous nanomaterial with more than 90% of its pores filled with air and can be assembled into nano-scale structures suitable for various applications. Current efforts in 2023 and 2024 include improving optical transmission through ambient pressure treatment to produce aerogels using a two-step sole-gel procedure and enable large scale industrial production/application. Historically, efforts have been made to improve the following aspects: (i) precursor preparation, (ii) gelation, (iii) aging, and (iv) drying. This brief review article intends to demonstrate the efforts made to: (i) synthesize a unique material (aerogels) with interesting properties using supercritical drying method; (ii) overcome the challenges caused by supercritical drying; (iii) modify the surface of a wet silica film prior to ambient pressure drying; (iv) regenerate the ion-exchange resin; (v) develop a single step sole-gel process to form a gel; (vi) synthesize optically transparent silica aerogels; (vii) prepare silica aerogel with the largest surface area by methods that are versatile, cost-effective, and not time consuming; (viii) investigate the recyclability of aerogels and manipulate their hydrophilicity or hydrophobicity and; and (ix) design aerogel-based water treatment system. This review article highlights the brief history and prospects of sodium silicate-based aerogels and its potential applications, particularly in water treatment. Critical issues affecting the large scale production of aerogels are also pointed out.

