

Aerogel Composites: Historical and Novel Synthesis Methods and Applications

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Abstract

Our poster seeks to provide a broad overview of the many wondrous properties of aerogel composites (which include hydrophobicity, low density, blue light scattering, and superb noise, heat, and electrical insulation), detail chronologically various methods of the material's synthesis (such as sol-gel polymerization and seed growth method), and offer insight into its vast array of present and future applications (in fields such as fashion, aerospace, and construction). Research on our project began in May 2019 and is expected to be completed in March 2020. During the span of our research, we analyzed a wide selection of scientific papers detailing the fabrication processes, chemical and physical properties, and history of aerogel. To supplement our research, we performed live experiments (with the assistance of our AP Chemistry teacher) on a small monolith sample we purchased online. In one test, we placed the aerogel on a metal ring fixed to a stand above a Bunsen burner, lighted the burner, and then placed a match on top of the aerogel (the match remained unlit, demonstrating the material's extraordinary heat-insulating capability). Though our poster seeks, in part, to exhibit our experience in the classroom in research and experimental design in the field of materials science, it most importantly seeks to instill within the viewer a curiosity and awe for the highly promising future of this novel material.