

技术及应用

可加工SiO₂气凝胶及其惯性约束聚变靶微柱制备

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摘要 以正硅酸乙酯 (TEOS) 为前驱体, 采用酸碱两步催化法制备SiO₂ 醇凝胶。醇凝胶分别经TEOS母液、六甲基二硅胺烷 (HMDSA) 处理后, 采用CO₂ 超临界干燥法制备出密度在30~100 mg/cm³的SiO₂气凝胶。用傅立叶变换红外光谱 (FTIR) 对疏水性SiO₂气凝胶进行了表征, 并用扫描电镜图研究了气凝胶改性前后的微观网络结构。改性后的气凝胶微观骨架变大, 部分细小的网络结构消失。改性后的气凝胶在潮湿环境中具有极好的尺寸稳定性和疏水性能。用精密车床加工出了满足惯性约束聚变物理试验要求的ICF靶微柱。

关键词 [惯性约束聚变](#) [二氧化硅](#) [气凝胶](#) [微柱](#)

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Fabrication of Silica Aerogel Micro-cylinder for Inertial Confinement Fusion Target

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Abstract The silica alco-gel was obtained by the 2-step acid-base catalyzed TEOS. Aging in a solution of tetraethoxysilane and trimethylating Si-OH groups increases the strength and stiffness of the wet gel due to the hexamethyldisilazane (HMDSA) on the surface of silica matrix. The modified silica aerogels were obtained by CO₂ supercritical drying method. The bulk density of aerogels is in the range of 30-100 mg/cm³. FTIR and some other methods were used to investigate the structure and hydrophobic properties. The results show that the aerogel possesses perfect size-stability and hydrophobic properties. The aerogel micro-cylinder for inertial confinement fusion targets were manufactured by lathe machine.

Key words [inertial](#) [confinement](#) [fusion](#) [silica](#) [aerogel](#) [micro-cylinder](#)

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