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## 折射率可调疏水型SiO<sub>2</sub>光学薄膜的制备研究

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**摘要** 以正硅酸乙酯 (TEOS)为有机醇盐先驱体,采用溶胶-凝胶技术,通过控制制备条件,结合三甲基氯硅烷(TMCS)对SiO<sub>2</sub>胶粒表面的修饰过程,制备出折射率可调的疏水型SiO<sub>2</sub>薄膜。对薄膜采用了不同的后处理方式,研究了氨和水蒸气混合气体热处理技术对薄膜疏水性能的影响。采用椭偏仪、FTIR和接触角测试仪对薄膜的折射率、红外特性、接触角等的测试研究表明:疏水型SiO<sub>2</sub>薄膜的折射率可在1.35~1.20之间连续可调,与传统热处理相比,混合气氛热处理使薄膜的折射率略有增加,在所研究的范围内折射率平均增加0.02左右;SiO<sub>2</sub>胶粒表面的亲水性OH基团可基本被非活性CH<sub>3</sub>基团代替,薄膜的疏水能力得到进一步提高;接触角由未作表面修饰时的40°左右增加到表面修饰并结合混合气氛热处理的137°左右

**关键词** [溶胶凝胶](#) [SiO<sub>2</sub>疏水薄膜](#) [表面修饰](#) [氨处理](#)

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## Preparation and Research of Hydrophobic Optical Silica Thin Film With Variable Refractive Index

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**Abstract** In the paper preparation and research of hydrophobic optical SiO<sub>2</sub> thin film are reported. The solution is prepared with a sol gel process and then modified by TMCS(trimethylchlorosilane). The films are prepared by dip coating method and different post methods are used to treat them. Ellipsometry, FTIR and contact angle instrument are used to measure the physical properties of the thin films. The results show that the refractive index of thin films are variable in the range from 1.35 to 1.20, OH groups on the surface of SiO<sub>2</sub> particles are replaced by CH<sub>3</sub> groups, the contact angle is increased to 137 degree of modified films, which are treated with mixed ammonia and water, from 40 degree of unmodified films.

**Key words** [sol gel process](#) [silica hydrophobic films](#) [surface modification](#) [ammonia treatment](#)

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