

doi: 10.3969/j.issn.1001-3849.2019.09.004

石英玻璃管磁粒研磨机理与光整试验研究

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摘要: 为了提高激光陀螺光学腔体内壁的光整度, 采用混合磨料法对石英玻璃管内表面进行粗磨光整试验, 研究了径向辅助磁极与球形辅助磁极链及不同质量比条件下的铁粒子和金刚石粒子对玻璃管内表面研磨效果的影响。结果表明: 在球形磁极链作为辅助磁极, 铁粒子与金刚石粒子质量比为 1:1 混合时, 研磨加工 60 min, 石英玻璃管研磨前后的表面粗糙度值 Ra 由原始 5.83 μm 下降至 0.51 μm。试件表面的纹理得到去除, 峰谷差值得到有效的降低, 研磨后管内表面的均匀性达到最好。

关键词: 混合磨料; 石英玻璃管; 辅助磁极; 质量比; 表面粗糙度

中图分类号: TG147

文献标识码: A

Research on Magnetite Grinding Mechanism and Finishing Test of Quartz Glass Tube

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Abstract: In order to improve the smoothness of the inner wall of the optical cavity of laser gyroscope, the rough polishing experiment of the inner surface of quartz glass tube was carried out by using mixed abrasive method. Influence of the radial auxiliary magnetic pole, spherical auxiliary magnetic pole chain and mass ratios of the iron and diamond particles on the grinding effect of the inner surface of the glass tube was studied. The results show that after grinding, the surface roughness Ra of quartz glass tube decreases from 5.83 μm to 0.51 μm when the mass ratio of iron particles to diamond particles is 1:1 and the spherical magnetic pole chain acts as the auxiliary magnetic pole. The surface texture of the specimen is removed, and the difference between peak and valley is effectively reduced. The uniformity of the inner surface of the tube is the best after grinding.

Keywords: mixed abrasive; quartz glass tube; auxiliary magnetic pole; mass ratio; surface roughness

先进技术材料中的石英玻璃、硅晶片因具有硬度高、脆性大等特点^[1-2], 使得它们在工业和科学学

术上的应用和研究领域相对广泛^[3]。又因其具有稳定性好、耐腐蚀和耐磨损的特点, 在光源外罩、半

收稿日期: 2019-04-22

修回日期: 2019-05-13

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基金项目: 国家自然科学基金项目(51105187)