

论文

空间用SiC反射镜表面改性的性能和可靠性评估

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摘要:

根据空间应用项目需求,采用等离子辅助电子束蒸发方法对RB SiC基底进行了表面改性,并对表面改性的性能和可靠性进行了相关评估.经测试,改性后RB SiC基底表面粗糙度(rms)降低到0.632 nm|散射系数降低到2.81%,500~1 000 nm范围的平均反射率提高到97.05%,已经接近于抛光良好的微晶玻璃的水平|改性涂层温度稳定性高,与基底结合牢固|加工后,面形精度达到0.119λ(PV)和0.014λ(rms),λ=632.8 nm.评估结果表明,这种SiC基底表面改性的工艺是可靠的,其光学性能满足空间高质量光学系统的要求,适宜空间环境应用.

关键词: RB-SiC SiC反射镜 表面改性 可靠性 RB-SiC SiC mirror surface modification reliability

Performance and Reliability Evaluation for The surface Modification of Space Used Silicon Carbide Mirror

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Abstract:

Surface modification for the RB SiC substrate is carried out using e beam evaporation with plasma ion assisted. The performance and reliability are evaluated according to the demand for space projects. After the surface modification, the surface roughness of the RB SiC substrate is reduced to 0.632 nm, the scattering coefficient is reduced to 2.81% and the average reflectance from 500 nm to 1 000 nm is raised to 97.05%. These data indicates that the modification process can get an obvious result close to that of the fine polished zerodur glass. And, the modification coating has a good temperature stability and a high adhesion to the RB SiC substrate. The surface figure precision of 0.119λ(PV) and 0.014λ(rms), (λ=632.8 nm) is obtained after optical surfacing. The optical and physical evaluation shows that this technics for the surface modification is reliable. The optical performance of the RB SiC surface after modification can meet the requirements of high quality optical system for space use.

Keywords:

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