

光学设计

短波通滤光片膜系设计

赵兴梅,师建涛,郭鸿香

西安应用光学研究所, 西安710065

收稿日期 修回日期 网络版发布日期 2007-7-13 接受日期

摘要 详细介绍用等效折射率概念设计短波通滤光片的原理和计算方法。根据原理和方法,选择二氧化钛(TiO₂)作为高折射率材料、二氧化硅(SiO₂)作为低折射率材料。首先从理论上计算出用这2

种材料设计的波长 $\lambda=950\sim 1150\text{nm}$ 的短波通滤光片所需要的周期数,

然后给出短波通滤光片的主膜系和光谱曲线。由于据此周期数设计出的膜系光谱曲线在750~

810nm处的透过率不符合要求,因此对该膜系进行了改进。依照改进的设计进行多次制备,

最终制备出了符合要求的短波通滤光片,找到了最佳制备工艺和方法。最后,

对制备出来的短波通滤光片薄膜进行了各种环境实验。实验结果表明,膜层的各项指标符合设计要求。

关键词 [短波通滤光片](#) [膜系设计](#) [等效折射率](#) [周期数](#)

分类号 [TN305.8](#)

Film system Design for short wavelength pass filter

ZHAO Xing-mei,SHI Jian-tao,GUO Hong-xiang

Xi'an Institute of Applied Optics, Xi'an 710065, China

Abstract The principle and calculation method to design short wavelength pass filters with a concept of equivalent refractive index is presented in this paper. TiO₂ was chosen as the material of high refractive index and SiO₂ as the material of low refractive index based on the principle and method. Periodicity of short wavelength pass filter at wavelength $\lambda=950\sim 1150\text{nm}$ was theoretically designed according to the concept of equivalent refractive index. The main film system and the spectrum curve of the short wavelength pass filter are presented. The design of the film system was corrected since its transmissivity did not meet the requirement at the range of wavelength $\lambda=750\sim 810\text{nm}$. The effect of the main processing technology and the film thickness on the optical characteristics of the short wavelength pass filter is described. As a result of the correction, the best way to make the film system was found. The film system prepared in this way was tested in different environment conditions. The experiment result shows that the specification of this film system can meet the requirement of the design.

Key words [short wavelength pass filter](#) [design of film system](#) [equivalent refractive index](#) [periodicity](#)

DOI:

通讯作者 赵兴梅 xingmeizh@126.com

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(193KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中包含“短波通滤光片”的相关文章](#)

▶ [本文作者相关文章](#)

· [赵兴梅](#)

· [师建涛](#)

· [郭鸿香](#)