

微光夜视器件与成像

MCP参数对微光像增强器分辨力影响研究

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摘要:

为了全面分析微通道板(MCP)参数对微光像增强器分辨力的影响, 利用电子散射理论分析了MCP输出电子横向散射和MCP非开口面的电子散射情况, 得到了MCP通道间距、输出电极结构和开口面积比等参数对微光像增强器分辨力的影响。分析结果指出: 通过减小通道间距、采用MCP输出面镀多层电极或增加MCP输出端电极深度实现减小MCP输出电子横向扩散、增加开口面积比等, 提高整个微光像增强器的分辨力。试验证明该方法有助于提高微光像增强器分辨力。

关键词: 微通道板 微光像增强器 分辨力

Effect of MCP parameters on resolution of image intensifier

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Abstract:

The performance of microchannel plate (MCP) is very important for the resolution of image intensifier. In order to analyze the impact of MCP parameters on the resolution of image intensifier, the transverse scattering of electrons from the output surface of MCP and the elastic scattering of electrons from the non-open surface of MCP were investigated by using electron scattering theory. The results show that the resolution of image intensifier can be improved by reducing channel distance, using multilayer electrodes, increasing the depth of output electrode and increasing open area ratio.

Keywords: microchannel plate image intensifier resolution

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参考文献:

[1] 周立伟, 刘玉岩.目标探测与识别 [M].北京: 北京理工大学出版社, 2002.  
ZHOU Li-wei, LIU Yu-yan. Target recognition and detection [M]. Beijing: Beijing Institute of Technology Press, 2002. (in Chinese)  
[2] 程耀进, 向世明, 师宏立.三代微光像增强器分辨力计算理论模型 [J].应用光学, 2007, 28(5): 578-581.  
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- [3] 向世明.双近贴聚焦微光像增强器分辨力理论极限问题研究[J].应用光学, 2008, 29(3): 351-353.  
XIANG Shi-ming. Theoretical resolution limit of double-proximity focusing image intensifiers [J] .Journal of Applied Optics, 2008, 29(3): 351-353.(in Chinese with an English abstract)
- [4] 潘京生.微通道板及其主要特征性能 [J] .应用光学, 2005, 25(5):25-29.  
PAN Jin-sheng. Microchannel plates and its main characteristics [J] .Journal of Applied Optics, 2005, 25(5): 25-29.(in Chinese with an English abstract)
- [5] ESTRERA J P,SALDANA M R.Gated power supply technologies for advanced image intensifiers [J] .SPIE, 2003, 4796: 60-70.
- [6] JACKSEN N F.Bonding method for microchannel plates [P] .US, 7021522 [P] .2006-04-04.
- [7] ROSINE S D, DEVOE N C. Microchannel plate having microchannels with deep funneled and/or step funneled openings and method of manufacturing same [P] . US,6876802 [P] .2005-04-05.
- [8] SIEGMUND O HW, TREMSIN A S, VALLERGA J V. Advanced MCP sensors for UV/visible astronomy and biology [J] .Nuclear Instruments and Methods in Physics Research A, 2003,510: 185-189.

本刊中的类似文章

1. 潘京生.三代像增强器用微通道板的改进与发展[J]. 应用光学, 2006,27(3): 211-215
2. 石峰;程宏昌;贺英萍;梁宏军 .MCP输入电子能量与微光像增强器信噪比的关系[J]. 应用光学, 2008,29(4): 562-564
3. 向世明.微光像增强器信噪比理论极限问题研究[J]. 应用光学, 2008,29(5): 724-726
4. 朱宇峰;张太民;聂晶;师宏立.低磁控溅射率MCP防离子反馈膜工艺研究[J]. 应用光学, 2008,29(3): 360-363
5. 向世明.双近贴聚焦微光像增强器分辨力理论极限问题研究[J]. 应用光学, 2008,29(3): 351-353
6. 孙忠文;黄永刚;贾金升;黄英;刘淑慈;刘辉;李国恩.酸蚀对微通道板电性能的影响[J]. 应用光学, 2008,29(2): 161-165
7. 向世明.微光像增强器光阴极灵敏度理论极限问题研究[J]. 应用光学, 2008,29(1): 48-51
8. 刘术林;彭磊;许志清;刘文伟;邓广绪;李军国 .高性能微通道板除气过程中电阻的变化[J]. 应用光学, 2007,28(6): 732-736
9. 程宏昌;石峰;候志鹏;师宏立;史鹏飞.微通道板(MCP)电子清刷用电子枪的设计 [J]. 应用光学, 2007,28(5): 582-586
10. 程耀进;向世明;师宏立.三代微光像增强器分辨力计算理论模型[J]. 应用光学, 2007,28(5): 578-581
11. 潘京生;苏德坦;刘术林;邓广绪 .一种玻璃成分优化的微通道板[J]. 应用光学, 2007,28(1): 16-19
12. 易家良;牛丽红;阔晓梅;周军兰 .半导体玻璃微通道板的研制[J]. 应用光学, 2007,28(2): 121-124
13. 潘京生.微通道板及其主要特征性能[J]. 应用光学, 2004,25(5): 25-29
14. 傅文红;常本康.扩口微通道板对电流增益和噪声因子关系的影响[J]. 应用光学, 2004,25(5): 22-24
15. 潘京生;苏德坦;许志清;刘术林.一种显著提高三代像增强器信噪比的微通道板[J]. 应用光学, 2007,28(3): 301-304