

夜视技术

微通道板(MCP)电子清刷用电子枪的设计

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摘要 为了满足Φ30mm MCP大束流短时间电子清刷新工艺要求,以轴向电子枪工作原理为基础,利用静电场对电子的作用理论,分析了电子的运动轨迹,并对电子的偏转进行了计算。根据计算结果,设计了电子枪的基本结构,确定了电子枪的各种参数:灯丝材料为Φ0.05mm的钨(75%)铼(25%)合金丝;灯丝形状为“V”字型;电子枪外径为Φ35mm,高度为20mm,最大加热功率为12.6W时,电子发射电流密度达到 $1.26 \times 10^{-5} \text{A/cm}^2$ 。用该电子枪对4块性能相近的Φ30mm MCP电子清刷4h后,MCP的增益值达到 500 ± 50 。这表明:用新电子枪可以代替原RUS-A型电子枪。

关键词 [微通道板\(MCP\)](#) [电子清刷用电子枪](#) [电子枪灯丝](#)

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Design of electron gun for scrubbing microchannel plate

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Abstract In order to have great electron flux for scrubbing Φ30nm microchannel plate and complete the process in less time. the trace of electron was analyzed and the electron deflection was calculated, according to the operation principle of the axial electron gun and the theory of the function of electrostatic field on electron. Based on the calculation result, the structure of the new electron gun was designed and all the parameters of the electron gun were determined, the filament material was Φ0.05mm tungsten rhenium alloy (75%, 25%), the filament was in “V” type, the radius of the electron gun was Φ35mm and its height was 20mm, and the current density of electron emission reached $1.26 \times 10^{-5} \text{A/cm}^2$ while the maximum filament heating power was 12.6W. The gain of the four microchannel plates reached 500 ± 50 after being scrubbed with the electron gun for four hours. The result indicates that the old electron gun RUS A can be replaced by the new one with better performance.

Key words [microchannel plate \(MCP\)](#) [electron gun for electron scrubbing](#) [filament of electron gun](#)

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