

论文

小孔径微通道板

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摘要:

从空间分辨能力、时间分辨能力和动态范围方面介绍了通道小型化发展的趋势, 根据微通道板性能和结构的关系分析了这种小型化带来的微通道板变形、破裂、结构错位等生产难题和解决方法。分析表明: 美国MCP的孔径发展依次是12μm, 10μm, 9μm, 8μm, 6μm和5μm, 先进国家微通道板孔径已经能够做到4μm~5μm, 夜视仪的分辨能力已超过100lp/mm; 通道直径降至5μm、4μm甚至更低, 通过改进材料成分和拉丝、排丝、压屏、酸溶工艺及设备可以实现5μm以下小通道微通道板的制造。

关键词: 微通道板; 小孔径; 超微型化; 空间分辨率

Microchannel plate with miniature channels

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Abstract:

The trend of miniaturization channel of MCP is introduced in the aspects of space resolution, time resolution and dynamic range. According to the relationship between MCP performance and structure, the problems such as distortion, crack, structure misplacement of microchannel plate caused by the channel miniaturization are discussed, and solutions for the problems are analyzed. The analysis shows, according to the "Omnibus I, II, III, IV" programs formulated by United States Department of Defense, the developing sequence of MCP pore pitch is 12μm, 10μm, 9μm, 8μm, 6μm and 5μm. Some developed countries can even make the aperture of the microchannel plate 4μm~5μm and the resolution of the night vision system with tiny pore MCP more than 100lp/mm. The miniaturization of the channel is the trend of high performance MCP development. By improving the material composition, techniques of fiber-drawing, stick-arranging, billet fabrication and chemical treatment as well as equipments, manufacturing MCP with less than 5μm pores can be achieved.

Keywords: microchannel plate miniature aperture miniaturization space resolution

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