



中子敏感的原子层沉积型微通道板探测器的物理与关键技术研究

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微通道板(MCP)

MOTIVATIONS

nMCP@U.C Berkeley

高性能像素芯片
Timepix@CERN

主要技术指标:

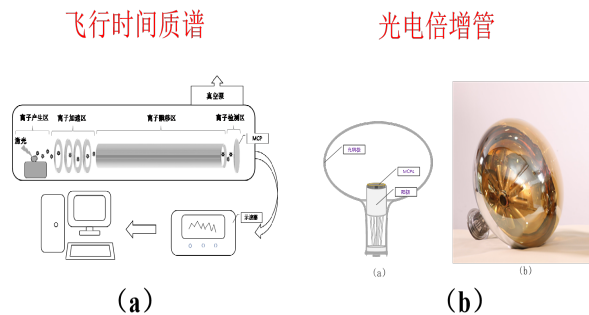
- 探测效率: ~20%
- 像素尺寸: 55 μm
- 伽马灵敏度: $\leq 1\%$
- 时间分辨率: 10ns

nMCP@清华大学

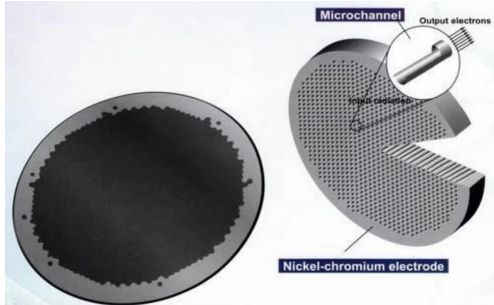
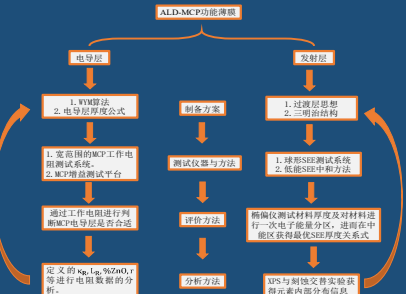
国内研究现状:

- 技术方面: 将Gd-nMCP经延迟线读出, Multi-hit严重, Gd-nMCP伽马鉴别能力差, 不适合中子探测。
- 器件参数: $\sim 130\mu\text{m}$
- 计数率: $\sim 100\text{kHz}$

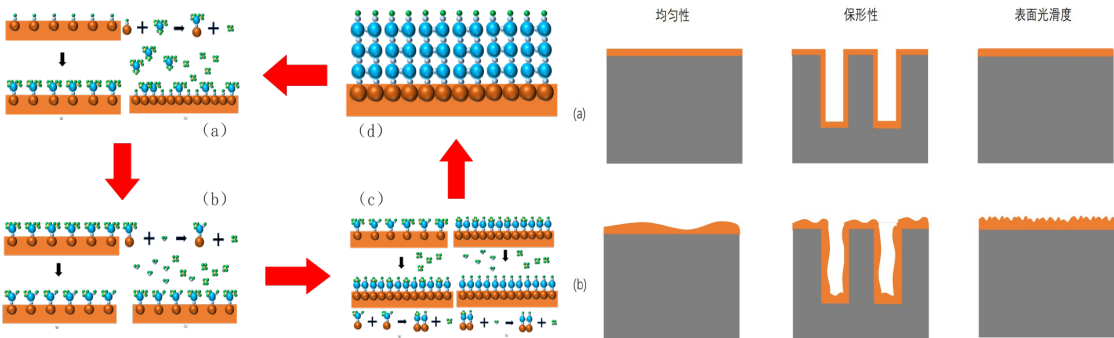
需要研制参数-nMCP性能型
ALD原子层沉积型微通道板, 保持低噪声低本底。



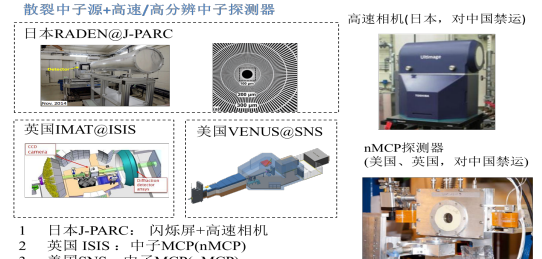
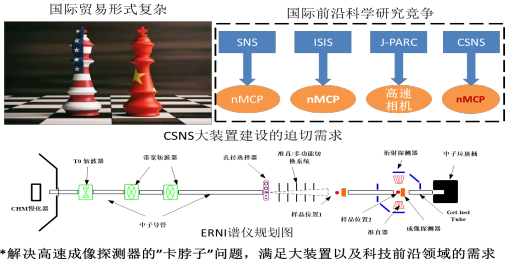
SUMMARY



原子层沉积技术(ALD)



原子层沉积型微通道板的高能物理需求和优势



Papers and patents

- Wang, Y., Liu, S., Yan, B. et al. The Design of the AZO Conductive Layer on Microchannel Plate. Nanoscale Res Lett 16, 55 (2021). <https://doi.org/10.1186/s11671-021-03515-0>
- Wang, Y., Yan, B., Wen, K. et al. The Design of the Emission Layer for Electron Multipliers. Nanoscale Res Lett 16, 151 (2021). <https://doi.org/10.1186/s11671-021-03606-y>
- patent number:
202210473415.5, 202210521586.0,
2020114919267, 20201121429929,
2020114226441, 2019104054183,
2020100139518

MCP-PMT阵列

