

技术及应用

# 粉末冶金态铍在北京谱仪束流管中的应用

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**摘要** 根据北京谱仪(BESIII)束流管对材料物理性能的要求, 对几种材料的物理性能进行比较后, 选择粉末冶金态铍作为BESIII束流管的中心管材料。采用失重法对粉末冶金态铍在1号电火花加工油中的耐腐蚀性能进行研究, 结果表明: 粉末冶金态铍在1号电火花加工油中具有较好的耐蚀性, 其腐蚀速率由初始的 $4.18 \times 10^{-7} \text{ kg} \cdot \text{m}^{-2} \cdot \text{h}^{-1}$ 逐渐变小, 并稳定为 $1.54 \times 10^{-7} \text{ kg} \cdot \text{m}^{-2} \cdot \text{h}^{-1}$ ; 在束流管10 a的设计寿命内, 粉末冶金态铍的最大腐蚀深度估算值为 $19.9 \mu\text{m}$ , 该值是BESIII束流管中心管最小厚度 $600 \mu\text{m}$ 的3.32%, 满足BESIII的工程运行要求。

**关键词** [铍](#) [腐蚀](#) [束流管](#) [北京谱仪BESIII](#)

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## Application of Powder Metallurgy Beryllium in Beijing Spectrometer III Beam Pipe

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**Abstract** According to the requirements of Beijing Spectrometer III (BESIII) beam pipe, the physical properties of several materials were compared and powder metallurgy beryllium was chosen as the material for the central pipe of the BESIII beam pipe. Weight-loss method was used to study the corrosion of powder metallurgy beryllium in No.1 oil for electron discharge machining (EDM-1). The result shows that the anticorrosive property of powder metallurgy beryllium in EDM-1 is high. The corrosion rate,  $4.18 \times 10^{-7} \text{ kg} \cdot \text{m}^{-2} \cdot \text{h}^{-1}$  in initial stage, becomes small with the lapse of the time and stabilizes at  $1.54 \times 10^{-7} \text{ kg} \cdot \text{m}^{-2} \cdot \text{h}^{-1}$  at last. It can be estimated that the powder metallurgy beryllium will be corroded  $19.9 \mu\text{m}$  in the depth in 10 years and it accounts for 3.32% of the smallest thickness of the central pipe, which satisfies the requirements of the BESIII.

**Key words** [beryllium](#) [corrosion](#) [beam pipe](#) [Beijing Spectrometer III](#)

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