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技术及应用

CSNS四极陶瓷真空盒磁控溅射镀TiN膜研究

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摘要 介绍了中国散裂中子源（CSNS）快循环同步加速器（RCS）中四极陶瓷真空盒内表面镀TiN膜技术与成膜系统装置。采用磁控溅射法，通过在绝缘体长直管道外表面安装金属屏幕罩来提供同轴电场的方法，解决了镀膜均匀性的问题。镀膜样品Ti、N比在0.9~1.1范围内，膜厚为100 nm左右，附着力达到要求，总体满足设计指标，完成了CSNS四极陶瓷真空盒样机的镀膜。

关键词 TiN膜 四极陶瓷真空盒 磁控溅射 绝缘体 长直管道

分类号

TiN Coating of CSNS Alumina Ceramics Vacuum Chambers for Quadrupole Magnets by Magnetron Sputtering

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Abstract Rapid cycling synchrotron (RCS) is a key accelerator of the China Spallation Neutron Source (CSNS), and the vacuum chambers for quadrupole magnets in RCS are alumina-ceramic. The sputtering-system was developed for TiN coating of the chambers. Magnetron sputtering was adopted. The metal screen was installed on the outer surface of the long straight insulating pipe, so it could provide a coaxial electric field with the cathode by DC power. This approach is convenient and practical, and is a very good solution to the coating uniformity. The Ti/N ratio is in 0.9-1.1, the film thickness is around 100 nm, and the adhesion between film and substrate also meets the requirements. The design specifications are generally achieved.

Key words TiN coating alumina-ceramic vacuum chambers magnetron sputtering long straight insulating pipe

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