

浸渍阴极的真空预处理技术*

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摘 要:本文总结了用于真空微波电子器件的浸渍阴极的蒸发规律,通过分析提出了浸渍阴极预处理工艺,建立了超高真空装置。在超高真空环境下,将浸渍阴极灯丝加热,使阴极温度升高到 1100~1200℃,保持 1~200h(温度和时间依不同微波管型而定)。预处理工艺解决了浸渍阴极发射与蒸发的矛盾,现已建立数十台、几十个工位的浸渍阴极预处理设备,大大提高了微波真空电子器件中电子枪的绝缘性能,减小了栅发射。浸渍阴极预处理工艺还可以加速检验热子的可靠性,从而避免微波器件在使用过程中才发现热子短路、热子缺陷及热子焊接点不牢等因素造成热子断路的问题,提高了微波真空电子器件中热子的可靠性。

关 键 词:真空微波电子器件,浸渍阴极,真空蒸发,阴极预处理

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Pretreatment of the Impregnated Cathode

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Abstract: The evaporation law of impregnated cathode for microwave vacuum electronic devices is summarized, and a pretreatment method of impregnated cathode is proposed. In the ultra-high vacuum, the cathode in the electron gun is heated. When the temperature rises to 1100~1200℃, and maintains for 1~200h (the temperature and time depend on different microwave tubes). This technology solves the contradiction between cathode emission and evaporation in the electron gun. More than a dozen impregnated cathode pretreatment equipments have been developed, which improves the insulation performance of the electron gun in microwave vacuum electronic devices and reduces the grid emission. At the same time, this technology can speed up the inspection of the reliability of the protons, thereby avoiding the problem of thermion disconnection caused by the defects of the heaters during the use of microwave devices, and improving the reliability of the heater in microwave vacuum electronic devices.

Key words: microwave vacuum electronics; impregnated cathode; evaporation; cathode pretreatment

真空微波电子技术是一个综合性极强的研究领域,它包括微波电子学、电子发射、真空技术、焊接技术、电磁场理论、材料技术、数值计算技术及计算机模拟仿真技术等学科^[1-3]。真空微波电子器件广泛应用于卫星通信、电子加速器、全球定位、可控热核聚变及未来军事前沿的高功率

微波武器等方面^[4-5],其独特的功能和优越的性能,尤其是在大功率和高频段的情况下,是其他固态器件所不能取代的。现代微波器件对微波信号的功率、频率、带宽等工作特性不断提出新的发展需求。这些需求主要表现在要求更高的频率、更长的寿命、更大的功率、更宽的频带、更高

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