


## 4H-SiC肖特基结式Alpha效应微型核电池

作　者：姚贤旺, 苑伟政, 乔大勇, 臧博

单　位：西北工业大学陕西省微/纳米系统重点实验室

基金项目：National Hi-tech Research and Development Program of China

摘　要：

本文阐述了一种4H-SiC肖特基结式Alpha效应微型核电池。利用Schottky结取代常用的p-n结，在活度为0.025mCi/cm2的241Am源辐照下进行测试，得到了开路电压VOC为0.25V、短路电流密度JSC为7.64nA/cm2和输出功率密度Pmax为1.12nW/cm2。在对4H-SiC肖特基结研制过程中的一些关键工艺进行研究之后，采用XRD法对欧姆接触成分进行了分析，结果表明形成了二元合金相Ni2Si。为了防止界面态密度的提高而导致漏电流增大，肖特基结的设计和加工过程都要严格控制污染源。考虑了本文中所讨论的几个重要影响因素之外，可通过更换大活度放射源、高效地收集方式和提高工艺质量等方式来提高电池的性能。

关键词：碳化硅，肖特基，Alpha效应电池， Am-241源，4H-SiC

## 4H-SiC Schottky Alphavoltaic Nuclear Battery

**Author's Name:**

**Institution:**

**Abstract:**

A 4H-SiC Schottky alphavoltaic nuclear battery is presented in this paper. It uses a Schottky barrier in place of the commonly used p-n diode, along with 241Am as the radioactive source. Some of the critical steps in process integration for fabricating Silicon carbide-based Schottky diode were addressed. Under illumination of 241Am with activity of 0.025mCi/cm2, an open circuit voltage (VOC) of 0.25V and a short circuit current density (JSC) of 7.64nA/cm2 are measured. The maximum output power density (Pmax) of 1.12nW/cm2 is obtained. And using XRD to analyse the composition of ohmic contact, the XRD analysis result shows that binary alloy phase Ni2Si is demonstrated. The study results indicate that careful design and fabrication process without impurities of the Schottky diode structure should be carried out to prevent bringing about an increased density of interface states, resulting in an increased dark current. 4H-SiC Schottky diodes were fabricated, taking into consideration all the important aspects discussed in this paper, and the performance of this battery is expected to be significantly improved by using larger activity and more efficient collection and optimizing the design and processing technology of the battery.

**Keywords:** Silicon carbide, Schottky, Alphavoltaic battery, 241Am, 4H-SiC

投稿时间：**2010-06-10**

查看pdf文件