

钽氮化合物电阻薄膜的研究进展*

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摘 要: 钽氮化合物薄膜材料具有电阻温度系数小、化学稳定性高、功率耐受性好和阻值可调范围大等优点, 是高性能电阻薄膜的优选材料。本文综述了钽氮化合物薄膜材料的研究进展, 从材料的制备工艺参数、后处理方式、微观相结构和元素掺杂等出发, 挖掘了获得高性能薄膜电阻的核心影响因素; 结合国内外研究现状, 对钽氮化合物薄膜电阻进一步发展存在的难点进行了分析。钽氮化合物薄膜已经成为电子功能材料发展的关键之一, 通过元素掺杂和后处理改善薄膜质量将成为进一步拓展其应用领域的重要手段。

关 键 词: 电子功能薄膜; 钽氮化物; 薄膜电阻; 物相

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Advances in Tantalum Nitride Resistors Thin Film Materials

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Abstract: Tantalum-nitrogen compound thin film materials have the advantages of small resistance temperature coefficient, high chemical stability, good power tolerance and wide adjustable resistance range, which are the preferred materials for high performance resistive thin films. This paper reviews the research progress of tantalum-nitrogen compound functional thin film materials, and explores the core influencing factors for obtaining high performance thin film resistance from the preparation process parameters, post-processing methods, microscopic phase structure and element doping of the materials. Combined with the domestic and international research status, the continued development of tantalum-nitrogen compound thin film resistance is analyzed. In conclusion, tantalum-nitrogen compound thin films have become one of the keys to the development of electronic functional materials, and improving the film quality through element doping and post-treatment will be important means to further expand their application fields.

Key words: electronic functional film; tantalum nitride; thin film resistance; physical phase

高端电阻作为我国“卡脖子”技术之一, 其研制从关键材料研发, 到核心工艺技术及高精度测试设备, 相较于国际前沿都有差距。特别是大功率、宽频带、高频率、微尺寸及高可靠的高端电阻

方面, 难以满足通信技术日新月异的发展要求。

相较于传统 Ni-Cr-Si 系合金^[1-2]、碳膜^[3]等薄膜电阻材料, 钽氮化合物具有功率耐受性强、熔点高、热稳定性好和耐酸性优良等特性^[4-7], 受到

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