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AlGaN/GaN HEMTs表面钝化抑制电流崩塌的机理研究

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摘要 通过实验测量对AlGaN/GaN HEMT表面钝化抑制电流崩塌的机理进行了深入研究. AlGaN/GaN HEMT Si_3N_4钝化层使用PECVD获得. 文章综合考虑了钝化前后器件输出特性及泄漏电流的变化，钝化后直流电流崩塌明显减少，仍然存在小的崩塌是由于GaN缓冲层中的陷阱对电子的捕获. 传输线模型测量表明，钝化后电流的增加是由于钝化消除了表面态密度进而增加了沟道载流子密度.

关键词 高电子迁移率晶体管 钝化 电流崩塌

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Mechanism study of the surface passivation effect on current collapse characteristics of AlGaN/GaN HEMTs

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Abstract

The effects of surface passivation on AlGaN/GaN high electron mobility transistors (HEMTs) have been investigated. The surface passivation layer of Si₃N₄ is deposited by plasma enhanced chemical vapor deposition (PECVD). The current voltage and gate drain diode characteristics of AlGaN/GaN HEMTs before and after passivation are analyzed. The current collapse under DC sweep has been significantly decreased after passivation and the existence of small dispersion of drain current is due to traps in the GaN buffer. The drain current increases after passivation, because surface passivation reduces the surface state density and so increases the sheet carrier density shown in Transmission Linear Model (TLM) measurement.

Key words high electron mobility transistors passivation current collapse

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