

Abstract Submitted
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Electrical characteristic of metal-oxide-semiconductor with NiSi₂ nanocrystals embedded in oxide layer JENN-KAI TSAI, IKAI LO, M.H. GAU, Y.L. CHEN, P.H. YEH, T.C. CHANG, PHYSICSDEPARTMENT, CENTER FOR NANOSCIENCE & NANOTECHNOLOGY, NATIONAL SUN YAT-SEN UNIVERSITY, KAO TEAM, DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, NATIONAL TSING HUA UNIVERSITY, HSINCHU, TAIWAN, REP COLLABORATION — The nano-structured electronic devices have received more attention recently. Metal-oxide-semiconductor structure with NiSi₂ nanocrystals embedded in the oxide layer, HfO₂/SiO₂, has been fabricated. Comparing with conventional ones, it could be operated under lower voltage and faster program/erase speed and has better endurance and retention. We have measured the temperature-dependent tunneling V-I curve on these HfO₂/SiO₂ nano-structured devices for the temperature from 1.2K to 300K. The results show an abnormal electrical characteristic. The tunneling V-I characteristics appear a new threshold voltage in the low temperature region, from 30K to 100K, while applied a negative voltage. The abnormal threshold voltage disappears when the temperature higher than 150K or lower than 30K. We attribute the new threshold voltage to the discrete quantum states of NiSi₂ nanocrystals in the oxide layer.

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