

Electrical characteristics of N₂ plasma treatments on SnO₂ nanowires FET**Yong-Hee Choi^{1,2*}, Junhong Na¹, Jae-Sung Kim¹, Jong Mok Shin¹ and Gyu Tae Kim¹**¹*School of Electrical Engineering, Korea University, Seoul, 136-701, Korea*²*Process Development Team, Semiconductor R&D Center, Samsung Electronics Co. Ltd., Hwasung, 445-701, Korea*

SnO₂ (tin oxide) are widely used in various research fields such as thin film transistors (TFTs) and sensors because of high electron mobility, flexibility and transparency. However, generally a large electrical hysteresis is often observed with voltage sweeps. To improve the device reliabilities of SnO₂ nanowires FETs, the N₂ plasma were treated. The N₂ plasma treatment on SnO₂ nanowires FET led to positive shift(4V) of V_{th} with a decrease of the hysteresis width on transfer characteristics. Despite the advantage of the reduction of hysteresis, the On-Off current ratio was significantly decreased and the degradation of the devices was observed with time. The threshold voltage shifted to the positive direction and the overall current was decreased. Furthermore, the hysteresis widths significantly increased. Passivation process was carried out with PMMA coating to prevent unnecessary changes of electrical properties after N₂ plasma treatment. The deterioration of the electrical properties is estimated by the recombination between oxygen vacancies on the surface of NWs and oxygen molecules in an ambient environment.

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