Comparisonstudy onelectrical performances of ZnO nanowire field effecttransistors fabricatedby various nanowire synthetic routes

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Zinc oxide nanowire is believed to be one of the most important semiconducting materials because of its superior properties, such as large piezoelectric constant, wide band gap energy, large exciton binding energy, highly thermal and mechanical stability, Therefore, it is suitable for the fabrication of variety of devices which includes transparent transistors, optoelectronic devices, chemical and biological sensing. However, it is well-known that it is very difficult to overcome the bottlenecks such as uniform metal-to-ZnO contacts and device-to-device variation for the purpose of commercialization in various applications.To address these issues, ZnO nanowire field-effect transistors (FETs) were fabricated by various approaches such as the conventional bottom-up method, and novel top down methods. According to theirfabrication methods, electrical performance of FETs was investigated with threshold voltage, on-off ratio, and device-to-device variations.Finally, the optimal device fabrication approach will be discussed.