Summary

Thin film transistors represent an interesting field of study for their application in flat panel active matrix liquid crystal displays. Oxide based thin film transistors are considered as a promising candidate for large area electronic applications and mobile devices owing to their high mobility, low temperature process ability. However, another key parameter is still lacking in the application of TFTs in mobile or wearable applications is the low power consumption, which determines the battery lifetime for these portable devices. Most of the TFT technologies are unable to meet the low power requirement due to the high biasing current needed for the operation. Moreover, the OFF current is also higher due to their narrower band gap. The minimum achievable power consumption is determined by the supply voltage and the OFF current. Hence, in order to overcome these limitations, our proposed research suggests that the low power operation can be achieved by operating the transistor in the sub threshold region by converting the leakage current into useful current. The thin film transistor can be fabricated to operate as an enhancement mode device with a smaller sub threshold swing and operating current in the range of pico to nano ampere scale. The smaller sub threshold swing will lead to increased transconductance and eventually achieve a high amplification factor. Also, since the transistor is operated at low voltage and current, it is expected to be electrically stable for long periods. This low power and high gain TFTs would be suitable for designing any high performance circuits in the near future.