

High-Performance and low-voltage current sense-amplifier using GAA-CNTFET with different chirality and channel



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ABSTRACT

As scaling down of transistors have become the major concern these days, it has led to the problems such as short channel effects, leakage current, high power consumption. To overcome these problems, CNTFETs are used which have proved itself as a promising device in the world of electronics. The property called as "Ballistic Transport" made it even popular. It led to the highly efficient conductivity of the current in the device. It is treated as the best replacement for MOSFETs. The parametric analysis has been carried out in this work for Current Sense amplifier for different chirality with different channels. Simulation results shows which combination of chirality, thickness oxide and dielectric constant is best suited for a specific application.

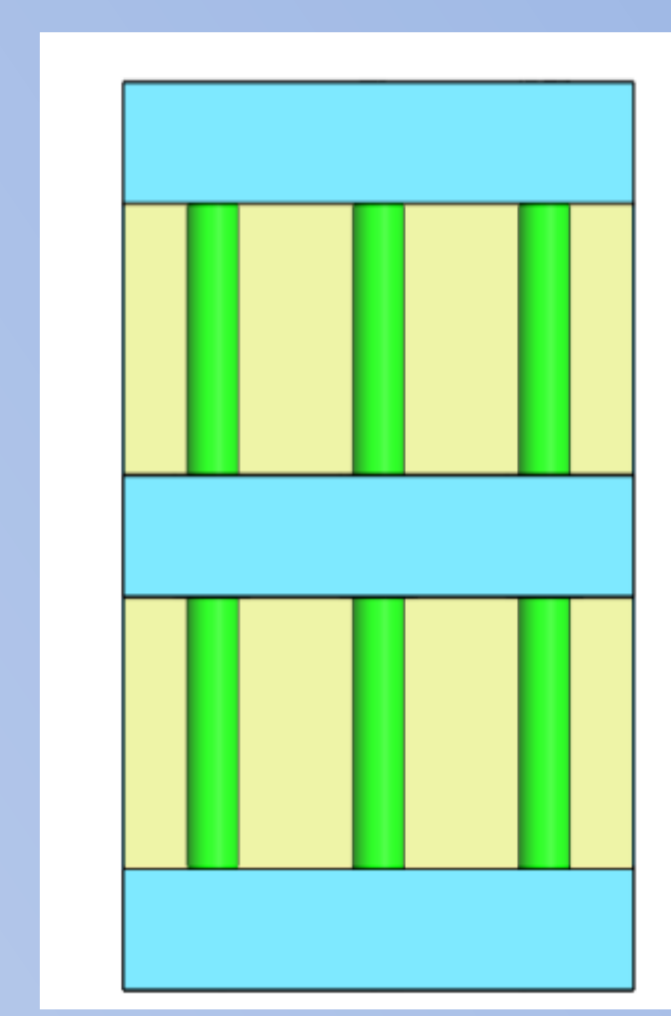
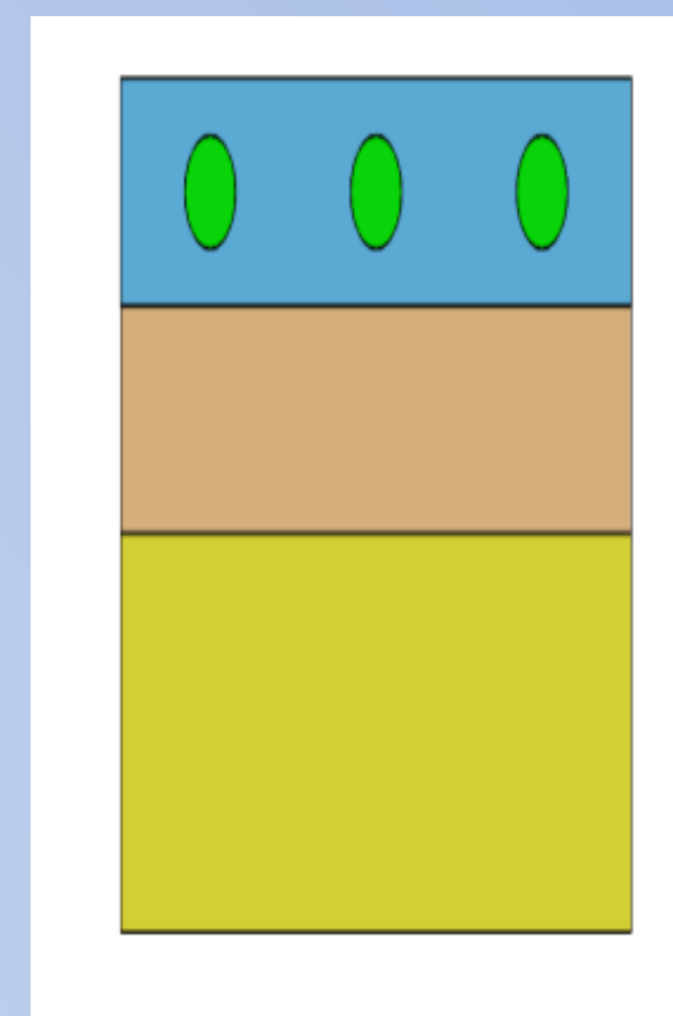
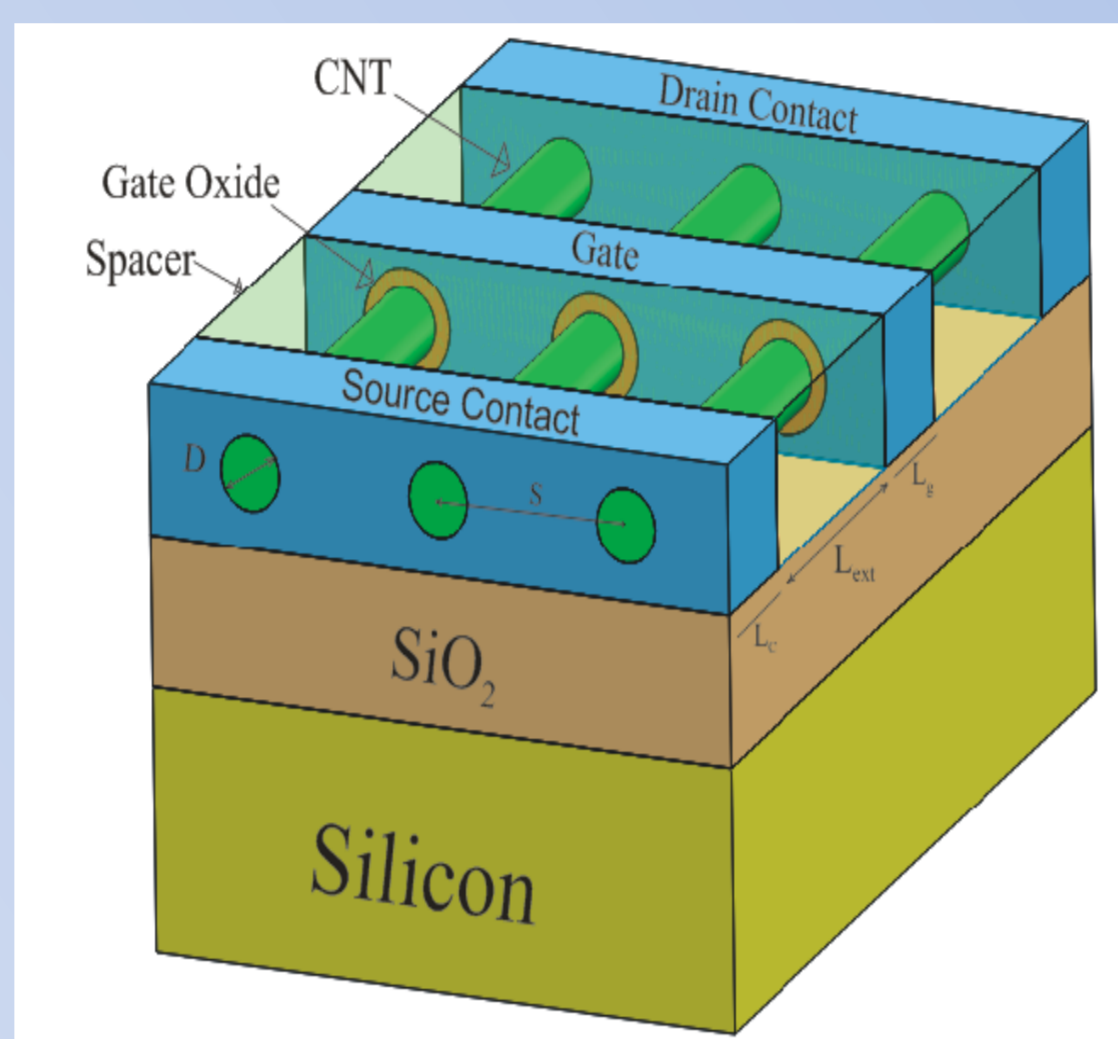
INTRODUCTION

The Moore's law states that the transistor size in the integrated chip scales down by the factor of two for every two years. Since late twentieth century, scaling down of transistors has become the important factor for technology advancements, but it has also led to serious limitations in the performance of device such as short channel effects, passive power consumption, electron tunneling through short channels. This limitation are eliminated by using the field-effect transistor called CNTFET.

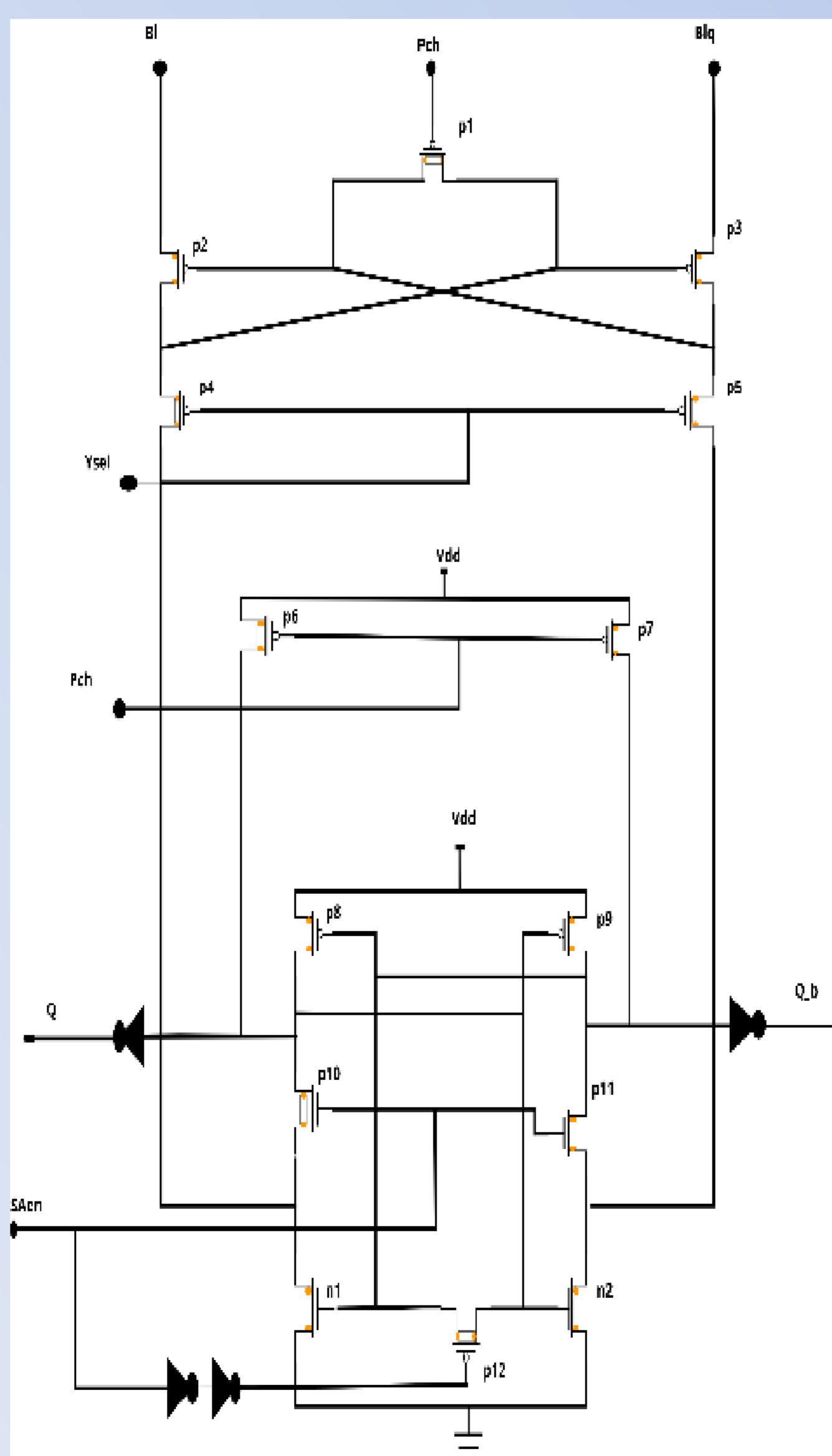
CONCLUSION

Interpreting the simulation results, it is informed there is a significant trade-off between power consumption and delay in CNTFETs which is found based on the performance of amplifier built using CNTFETs. Based upon the application to be used the combination of chirality values, thickness oxide and dielectric oxide values should be chosen wisely to obtain optimal performance.

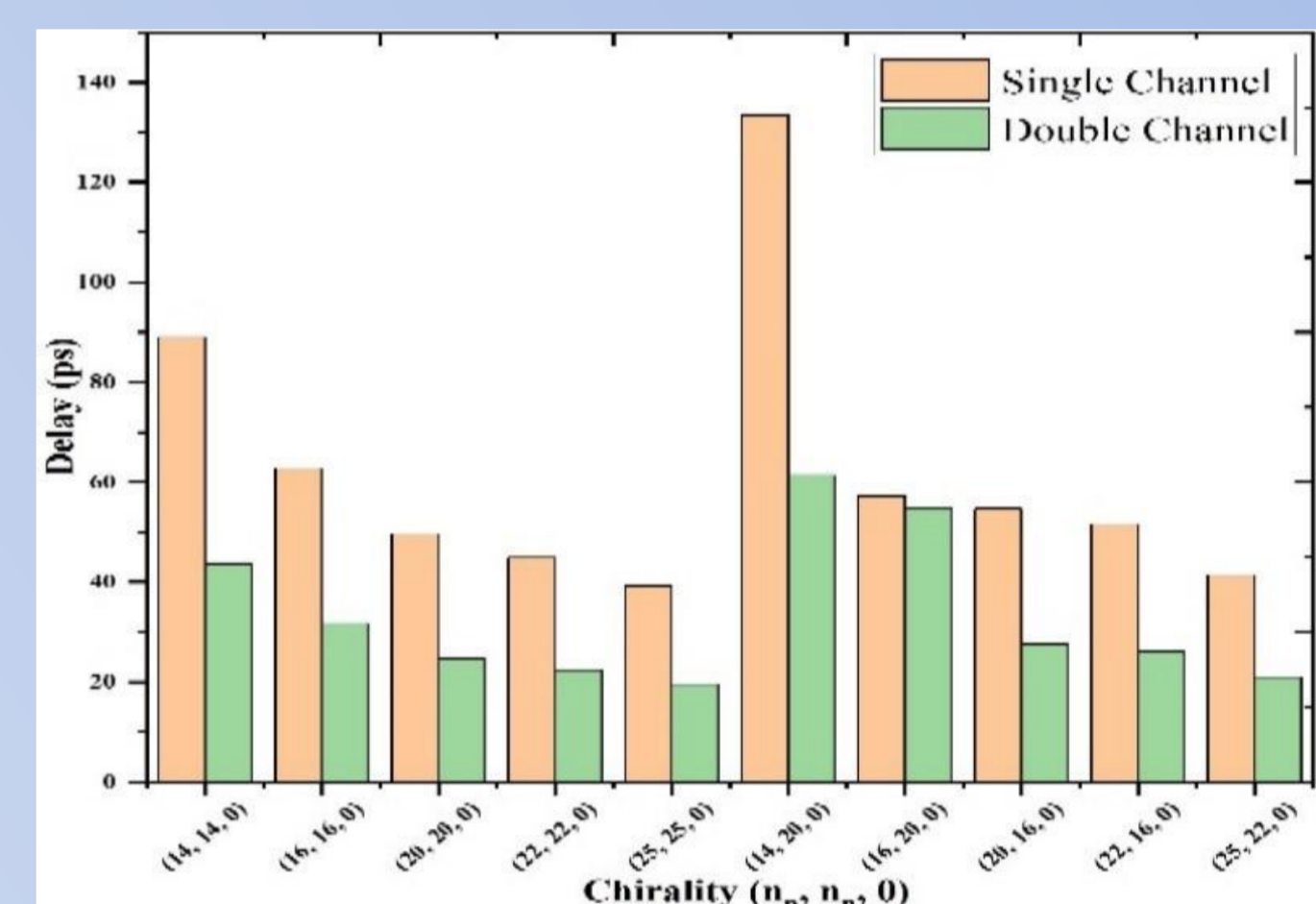
RESULTS & DISCUSSION



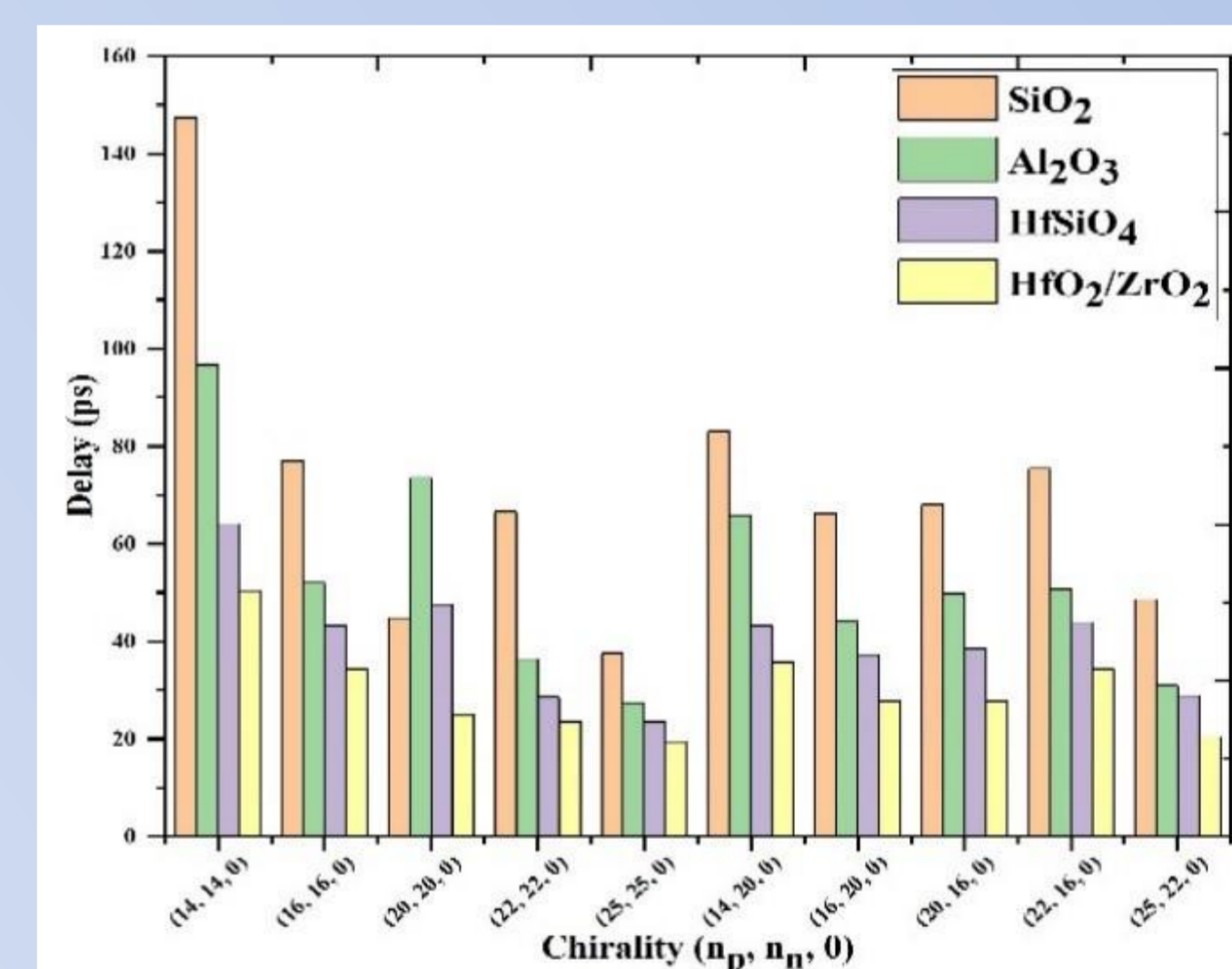
• GAA-Structure of CNTFET



• Circuit diagram of Current Sense Amplifier



Graph for Chirality vs. Delay of Single Channel and Double Channel CNTFETs



Graph for Chirality vs. Delay of Single Channel and Double Channel CNTFETs having the different value of K_{ox}

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