

# Chapter 6

## Conclusion and Future Work

In this research, the key issues corresponding the front-end and backend in fabricating radio frequency SOC by BiCMOS technology including the SiGe HBT and low-K dielectric material have been discussed. Several critical behavior of SiGe HBT devices involving the device profile design in collector and associated fabrication processes have been demonstrated though theoretical and experimental approaches. These work could help the device and circuit designer to learn about the HBT devices more precisely in physical and direct way and thus improve their product more efficiently. Besides, an efficient technology for pre-treating the low-K material by  $\text{NH}_3$  plasma has been proven to be successfully improve the physical and electrical properties of the low-K film and made such low-K material a potential IMD candidate for copper comparable backend system in advanced SiGe BiCMOS technology.

Through this research, it was mentioned that there were still several works which was interesting and worthy to pursue. First, the sensitivity of  $1/f$  noise characteristics to the physics discussed in chapter 3 and 4 could be a potential research topic. Second, it was strongly suggested that the physics involved in this

research should be included into a SPICE comparable large signal model. Third,  $\text{NH}_3$  plasma pretreatment technology for spin-on low-K for the application of multi-layer interconnection backend system associated with the passive components including MIMCAP and spiral inductor were valuable to be developed. The possible topics described above could be very valuable and practical in SOC and RFIC applications.

