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Carbon nanotube transistor based high-frequency electronics[1]

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At the nanoscale carbon nanotubes (CNTs) have higher carrier mobility and carrier velocity than most incumbent semiconductors. Thus CNT based field-effect transistors (FETs) are being considered as strong candidates for replacing existing MOSFETs in digital applications. In addition, the predicted high intrinsic transit frequency and the more recent finding of ways to achieve highly linear transfer characteristics have inspired investigations on analog high-frequency (HF) applications. High linearity is extremely valuable for an energy efficient usage of the frequency spectrum, particularly in mobile communications. Compared to digital applications, the much more relaxed constraints for CNT placement and lithography combined with already achieved operating frequencies of at least 10 GHz for fabricated devices make an early entry in the low GHz HF market more feasible than in large-scale digital circuits. Such a market entry would be extremely beneficial for funding the development of production CNTFET based process technology. This talk will provide an overview on the present status and feasibility of HF CNTFET technology will be given from an engineering point of view, including device modeling, experimental results, and existing roadblocks.

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