Takestan Institute of Higher Education

Available online at **http://UCTjournals.com**

UCT Journal of Research in Science, Engineering and Technology

UCT. J. Resea. Scien. Engineer.Techno. (UJRSET)

Volume 3,Issue4 *01-09 (2015)* *ISSN 2382-977X*

Evaluation and Comparison of CMOS logic circuits with CNTFET

Mahsa Sedaghat[1]*, Mahdi Salimi[2]

[1]:Young Researchers and Elite Club, Ardabil Branch, Islamic Azad University, Ardabil, Iran, mahsa.sdt1992@gmail.com .
[2]: Department of Engineering, Ardabil Branch, Islamic Azad University, Ardabil, Iran.
**Author for Correspondence*

ABSTRACT

In this paper, a comparison between CMOS and MOSFET base circuits HSPICE is done with software. 0.13μ CMOS transistor model for simulation and CNTFET Model of Stanford University used. In simulations amounts of power, circuit delay and PDP is calculated and these values were compared at the end. And tried to CNTFET applications of transistors in circuit design, including memory and logic circuits Ternary be expressed.

Original Article:

Received 18 Sep. 2015
Accepted 24 Dec. 2015
Published 30 Dec. 2015

Keywords:
CMOS, CNTFET, Nanotube

Introduction

CNTFET transistors due to their small size and properties of polarity change is expected to be the best alternative for CMOS transistors [1]. Monopolar and bipolar transistors are made in the two samples (Ambipolar) [2]. Ambipolar type because of the variability of the electrical signal polarity, is suitable for the implementation of programmable logic circuits. But now CNTFET transistors are unstable [3]. After making the transistor to give a good answer in some cases, but sometimes, it's not good properties and does not answer well. Even with pessimistic assumptions CNTFET nano electronics can be achieved remarkable performance compared to silicon technology. Electronic conductivity and thermal conductivity of nanotubes good or even better than precious metals. The mechanical strength of carbon nanotubes is very high. The benefits of a good system of CNT-based electronic devices is expected, However, many of the challenges of technology and materials for them. Controlled growth of CNT still needs to dominate. In connection to the source/drain on CNT ideal mechanism for better estimating the performance of the device is required. Replacing the metal connection joint CNT Source/Body with a very high doped source/drain (ohmic like) can improve the device performance.

2. CNTFET

In 1991, for first time Sumio Iijima observed carbon nanotubes [4]. A carbon nanotube in CNTFET is placed between drain and source of the transistor, Fig.1 . This model is based on Stanford CNTFET model [5].

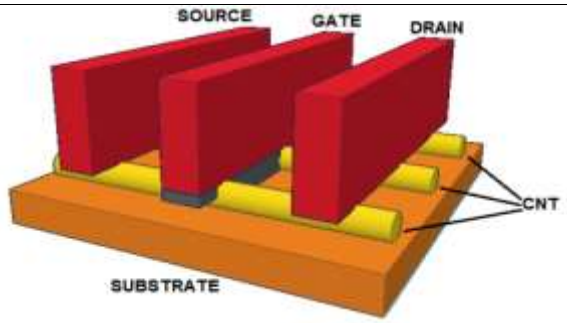

Figure 1: CNTFET transistor

CNTFET have some Features, like: low cost and high degree of reliability. When gate lengths are scaled down in nanoscales, it results in various crucial challenges and reliability issues that may reduce its potential for energy efficient applications [6]. Typical electrical properties of CNTFETs like higher speed, higher dielectric constant and stability provides good characteristics than Silicon based MOSFETs [7]. There are different classifications for CNTFET structures, like: 1. Multi Wall CNT (MWCNT): Each CNT contains several hollow cylinders of carbon atoms nested inside each other, 2. Single Wall CNT (SWCNT): that is made of just a single layer of carbon atoms. These are most common type of CNTFET. Fig.2 represents different types of CNTFET.