

# Silicon-on-Insulator Complementary Metal Oxide Semiconductor Image Sensor Using a Nanowire Metal Oxide Semiconductor Field-Effect Transistor-Structure Photodetector

Mi-Young Do, Sung-Ho Lee, Sang-Ho Seo, Jang-Kyoo Shin\*  
Pyung Choi, Jae-Hyoun Park<sup>1</sup> and Hoon Kim<sup>1</sup>

School of Electrical Engineering and Computer Science, Kyungpook National University,  
1370 Sankyuk-dong, Buk-ku, Daegu, 702-701, Korea

<sup>1</sup>Korea Electronics Technology Institute, 68 Yatap-dong, Bundang-gu,  
Seongnam-si, Kyunggi-do, 463-816, Korea

(Received February 27, 2006; accepted April 6, 2006)

**Key words:** SOI, CIS, nanowire, MOSFET photodetector, APS

To design a silicon-on-insulator (SOI) complementary metal oxide semiconductor (CMOS) image sensor using a nanowire metal-oxide semiconductor field-effect transistor (MOSFET)-structure photodetector, SOI MOSFET model parameters were extracted by using the equation of bulk MOSFET model parameters. They were optimized by using a simulation program with integrated circuit emphasis (SPICE) level 2. Simulation results of the I-V characteristics of the SOI MOSFET using the extracted model parameters were compared to the experimental I-V characteristics of the fabricated SOI NMOSFET. The simulation results were in good agreement with the experimental results. An active pixel sensor (APS)-type unit pixel was designed for a SOI CMOS image sensor. The response time of the SOI CMOS image sensor is shorter than that of the bulk CMOS image sensor with the same structure. In accordance with the array simulation results of the SOI CMOS image sensor, they exhibited a clearer image than the bulk CMOS image sensor, due to a better frequency response.

\*Corresponding author, e-mail address: jkshin@ee.knu.ac.kr