

Source Follower가 집적된 능동형 반도체 미세전극 어레이의 제작

안순관, 탁금영, 김성준
 서울대학교 공과대학 전기공학부

Active Semiconductor Microelectrode Array With Monolithically Integrated Source Followers

S. K. An, G. Y. Tak, S. J. Kim
 School of electrical Engineering, College of Engineering, Seoul National University

ABSTRACT

An active semiconductor microelectrode array is fabricated with monolithically integrated source followers for recording neural signal from CNS(central nervous system). Source follower as an impedance buffer for effective neural signal recording is designed and fabricated using 1.5 μ m standard CMOS process technology of SNU ISRC (Interuniversity Semiconductor Research Center). In order to make the structure of electrode, the backside of the wafer was etched by isotropic dry-etching after making trench on front side of the wafer on which have CMOS circuits. In the aspect of process time and the CMOS compatibility, the backside dry-etching method is superior to the wet-etching method that has been used generally. By measuring the circuit characteristics after every step of process, we can prove the source follower works functionally without any change of characteristics. This result suggests that our silicon micro-electrode fabrication process is compatible with standard CMOS process technology.

서론

[1] CMOS (active circuit) (CMOS compatibility) (biocompatible)

가
 CMOS
 제작 및 측정
 가 (Impedance buffer)
 CMOS (thermal noise)
 1/f
 1/f CMOS
 [2] 가 MOS
 NMOS
 PMOS 1,2 AC
 0.853, DC 5 1.9V 가 5
 MPC(Multi Project Chip) 1.5 μ m CMOS
 CMOS (Micromachining)

- 1.
2. site
- 3.
4. Pad ()
5. ()
- 6.

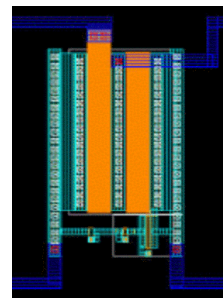
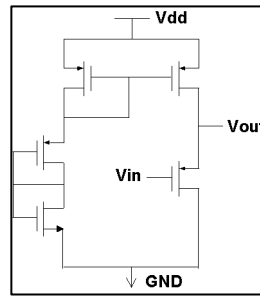


그림 1. Schematic

그림 2. Layout

CMOS

결과

3
5 30 μ m
60 μ m. 200 μ m
x 30 μ m 가 100 μ m

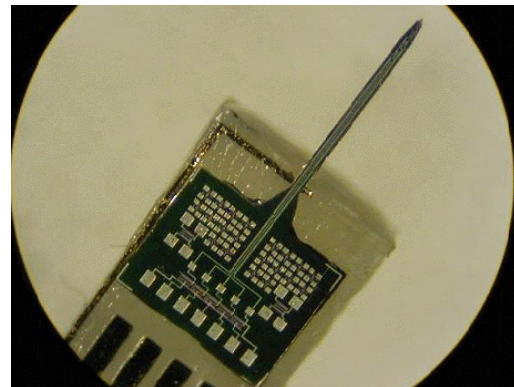


그림 3. 제작된 능동형 반도체 미세전극

CMOS

DC

(4, 5)
AC 0.882, DC
1.96V

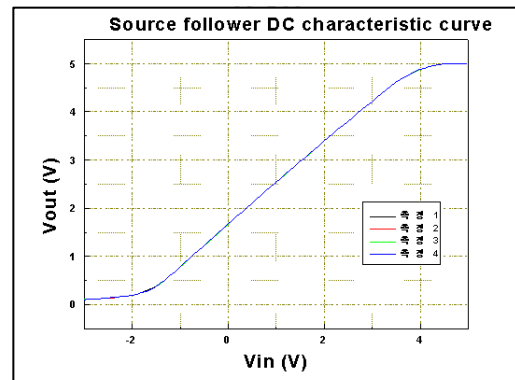


그림 4. Source Follower의 DC특성곡선

결과

가

CMOS

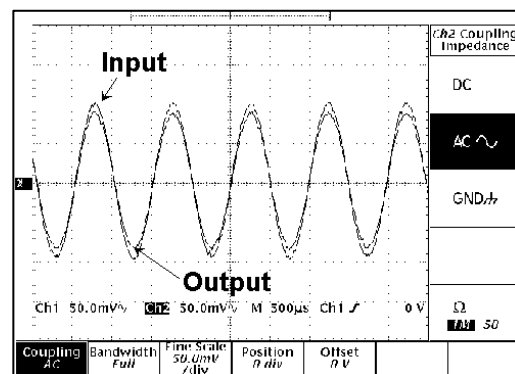


그림 5. 정현파 입력시의 입출력 파형

[1] "A Micromachined Silicon Depth Probe for Multi-Channel Neural Recording" T.H.Yoon, E.J.Hwang,D.Y.Shin,S.I.Park,S.J.Oh,S.C.Jung,H.C.S hin, and S.J.Kim, [IEEE Trans. on Biomedical Eng., Vol 47, No.8, 2000]

[2] "Noise Performance Design of Preamplifiers for Silicon Microelectrodes with On-chip Electronics" Kyung Hwan Kim and Sung June Kim [IEEE-EMBS Meeting Chicago, USA, July 23-28, 2000