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 利用形態 : 技術代行
 利用課題名(日本語) : C-MOS Co-Doped Transistor and PN Diode 回路の試作と評価
 Program Title (English) : Design and performance evaluation of n-type, Co-Doped Transistor and PN Diode Circuits
 利用者名(日本語) : パンディ チトラ
 Username (English) : PANDY CHITRA
 所属名(日本語) : 静岡大学 自然科学系教育部 ナノビジョン工学専攻
 Affiliation (English) : Graduate School of Science and Technology, Shizuoka University
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1. 概要(Summary)

Integrated circuits (ICs) are a versatile concept for high-performance electronics, coupling a large number of transistors onto the chip. During recent years, new device structures raise high research interest, so I designed n-doped and Co-doped transistors, pn diodes and SRAM circuit using Layout editor tool. The fabrication of devices was carried out by RNBS, Hiroshima University, then electrical characterization was done.

2. 実験(Experimental)

【利用した主な装置】

During this experiment, following instruments were used, among others: Layout design tool, oxidation furnace, maskless lithography system, ion implantation equipment, well diffusion furnace, sputtering equipment (for Al), etching equipment (for ashing), PMA annealing furnace.

【実験方法】

Designed circuits are fabricated by the following process steps: i) N-well formation; ii) active-region formation; iii) source and drain formation; iv) formation of gate oxide film; v) contact hole formation and vi) Al electrode formation by using sputtering, maskless exposure system., etc.

3. 結果と考察(Results and Discussion)

Fig. 1(a) shows a microscope image of the fabricated Co-doped transistor. The W/L of nMOS and pMOS transistors is 15/10 (expressed in μm). Gate oxide thickness is 18 nm. Electrical characteristics are measured for all the fabricated

devices using semiconductor parameter analyzer for $T = 300$ K. Co-doped transistors exhibit overall metallic behavior (transistor is not switched off even at larger V_G), although weak pMOS transistor characteristics are observed.

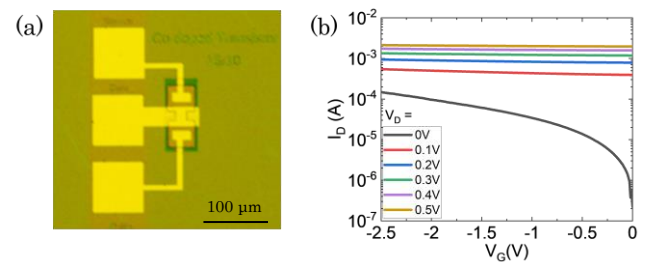


Fig. 1

(a) Fabricated Co-Doped Transistor (microscope).

(b) I_D - V_G characteristics at $T = 300$ K.

In addition to Co-Doped Transistor, basic nMOS, pMOS transistor, CMOS inverter, n-type doped transistor and PN diodes were also fabricated, and their electrical characteristics were evaluated successfully. The measured characteristics of all fabricated devices and circuits are in good accordance with the theoretical well-known characteristics, as basic confirmation of processes.

4. その他・特記事項(Others)

I would like to thank everyone in the RNBS, Hiroshima University. Special thanks to Shinji Yamada and Prof. Shin-ichiro Kuroki for their valuable guidance and support.

5. 論文・学会発表(Publication/Presentation)

None

6. 関連特許(Patent)

None