

Temperature dependence of current in InAsSb-based p - n photodiode

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The temperature dependence of the dark current in InAsSb-based p - n photodiode detecting radiation in the medium-wave infrared (MWIR) region have been calculated, taking into account material characteristics of InAs_{1-x}Sb_x alloy. The desired signal-to-noise ratio is $\sim 10^3$ at $T = 150$ K, which confirms the possibility of achieving high photovoltaic parameters in InAs_{1-x}Sb_x photodiodes and their usage in high-temperature applications.

Keywords: MWIR, InSb, InAsSb, quantum efficiency, dark current, photodiode.

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REFERENCES

1. Rogalski A., Antoszewski J. and Faraone L., J. Appl. Phys. **105**, 091101 (2009).
2. Rogalski A., Proc. SPIE **10433**, 104330L (2017).
3. Rzeghi M., Eur. Phys. J. AP, № 23, 149–205 (2003).
4. Bakarov A. K., Gutakovskii A. K., Zhuravlev K. S., Kovchavtsev A. P., Toropov A. I., Burlakov I. D., Boltar' K. O., Vlasov P. V. and Lopukhin A. A., Technical Physics **62** (6), 915–919 (2017).
5. Saginov L. D. ISES Solar World Congress, Conference Proceedings. Daegu, Korea 8–12 November, 2015, pp. 332–335. DOI: 10.18086/swc.2015.05.04
6. Gershon G., Avnon E., Brumer M., Freiman W., Karni Y., Niderman T., Ofer O., Rosenstock T., Seref D., Shiloah N., Shkedy L., Tessler R., Shtrichman I. Proc. of SPIE. Infrared Technology and Applications XLIII. **10177**, p. 101771I (2017).
7. Wieder H. H. and Clawson A. R., Thin Solid Films **15**, 217 (1973).
8. Rogalski A. and JoYwikowski K., Infrared Phys. **29**, 35 (1989).
9. Handbook series on semiconductor parameters / edited by Levinshtein M., Rumyantsev S., Shur M. Vol. 2: Ternary and Quaternary A₃B₅ Semiconductors. – P. World Scientific Publishing Co. Pte. Ltd. 1999. P. 132–152.
10. Shalimova K. V., Fizika poluprovodnikov, Moscow, Energoatomizdat, 1985, pp. 224–239.
11. Lopes V. C., Syllaios A. J. and Chen M. C., Semiconductor Science and Technology, № 8, 824–841 (1993).
12. Rogalski A. and Orman Z., Infrared Phys. **25**, 551–560 (1985).