



## MERA 4

### 1. Junctionless silicon-based device for CO<sub>2</sub> and N<sub>2</sub>O gas detection at room temperature

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#### **Abstract**

This article presents a fabrication of junctionless sub-micron silicon wire based device by means of atomic force microscope nanolithography for carbon dioxide and nitrous oxide gas detection. The final product was obtained after a sequence step of silicon and silicon dioxide etching process. The device consisted of three parallel sub-micron silicon wires which connected to two adjacent contact pads. The obtained silicon wires width ranging between 233 nm to 340 nm which fabricated under a controlled environment. This experiment utilized the use of silicon-on-insulator wafer as a raw material and atomic force microscope nanolithography as a method to fabricate the device structure. The bare device was electrically characterized using semiconductor parameter analyzer and behaved as a resistor where there was a current flow from one contact point to another contact point. The functionality of the fabricated junctionless device was prolonged by tested the device under gaseous environment at room temperature. The device resistivity was increased upon exposure to both target gases compared with before gas exposure. The response time and recovery time of the device was observed to be less than 1 minute for both target gases. The fabricated junctionless sub-micron silicon device showed higher sensitivity to carbon dioxide gas which calculated to be 138 %.

**Keywords:** Junctionless; AFM nanolithography; Gas sensing device; Room temperature.

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