

Biomed Detection Via Specific Oxide Materials Based Sensor For Medical Applications

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Introduction This paper simulates a specific oxide coated MEMS based gas sensor along with the analysis of various parameters such as power consumption, temperature uniformity, resistance change, sensitivity and selectivity.

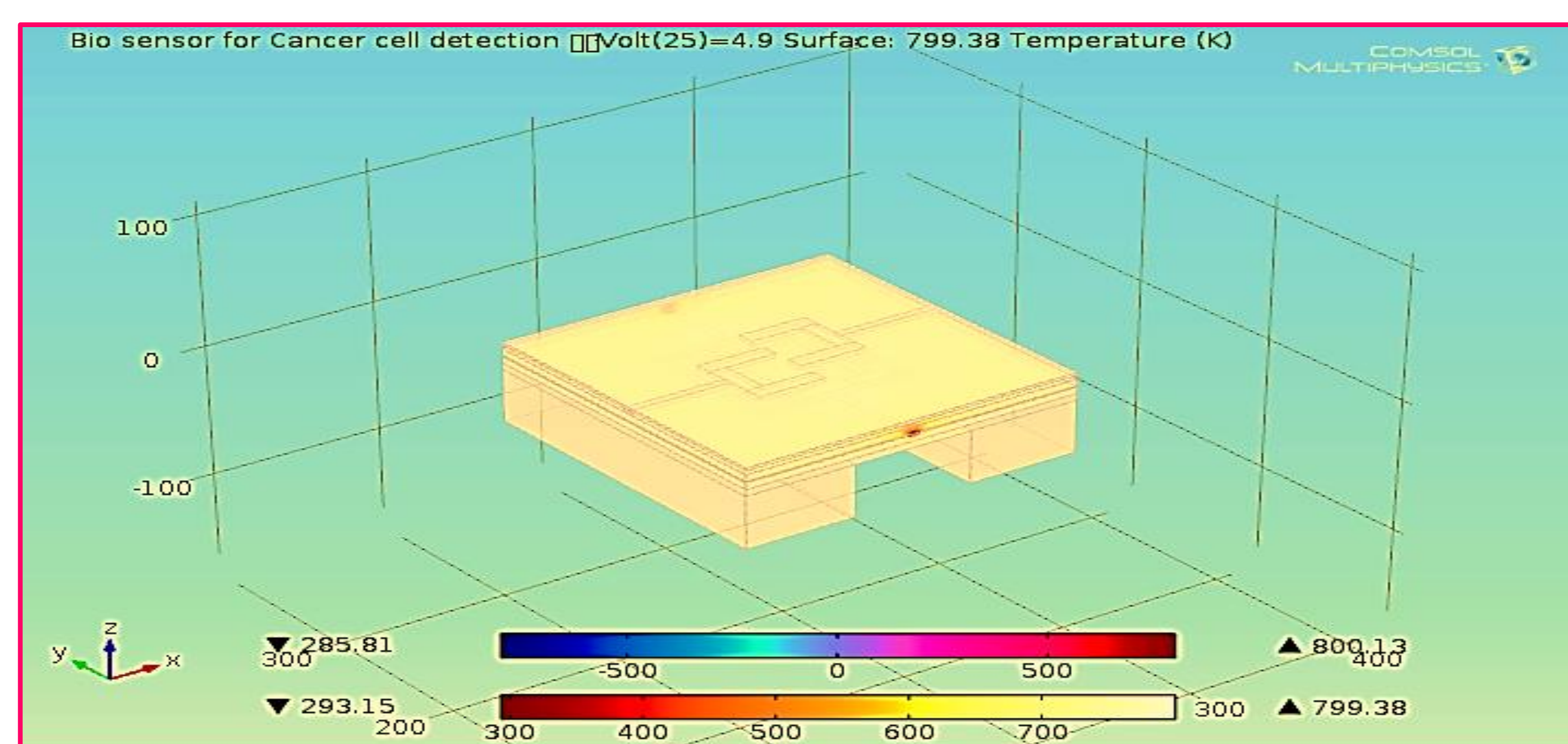


Figure 1. Bio sensor for cancer cell detection using SOM.

Computational Methods:

Study of Gas Flow Detection By Laminar Flow Method and

Electric Current Model:

$$r(u.\tilde{N})u = \tilde{N} \cdot [-pl + m(\tilde{N}u + (\tilde{N}u)T) - 2/3m(\tilde{N}.u)I](3)\tilde{N} \cdot (ru) = 0$$

The Porous silicon reacts with the gas and hence the concentration at the outlet is,

$$-n Di \tilde{N}ci = 0$$

PHYSICAL ARCHITECTURE: The sensor is 500 μm * 500 μm in length and width and 41 μm in height. The p-type substrate is isolated from other layers by means of a 5μm thick Silicon Dioxide layer. Thickness of the p-type substrate 20 μm.

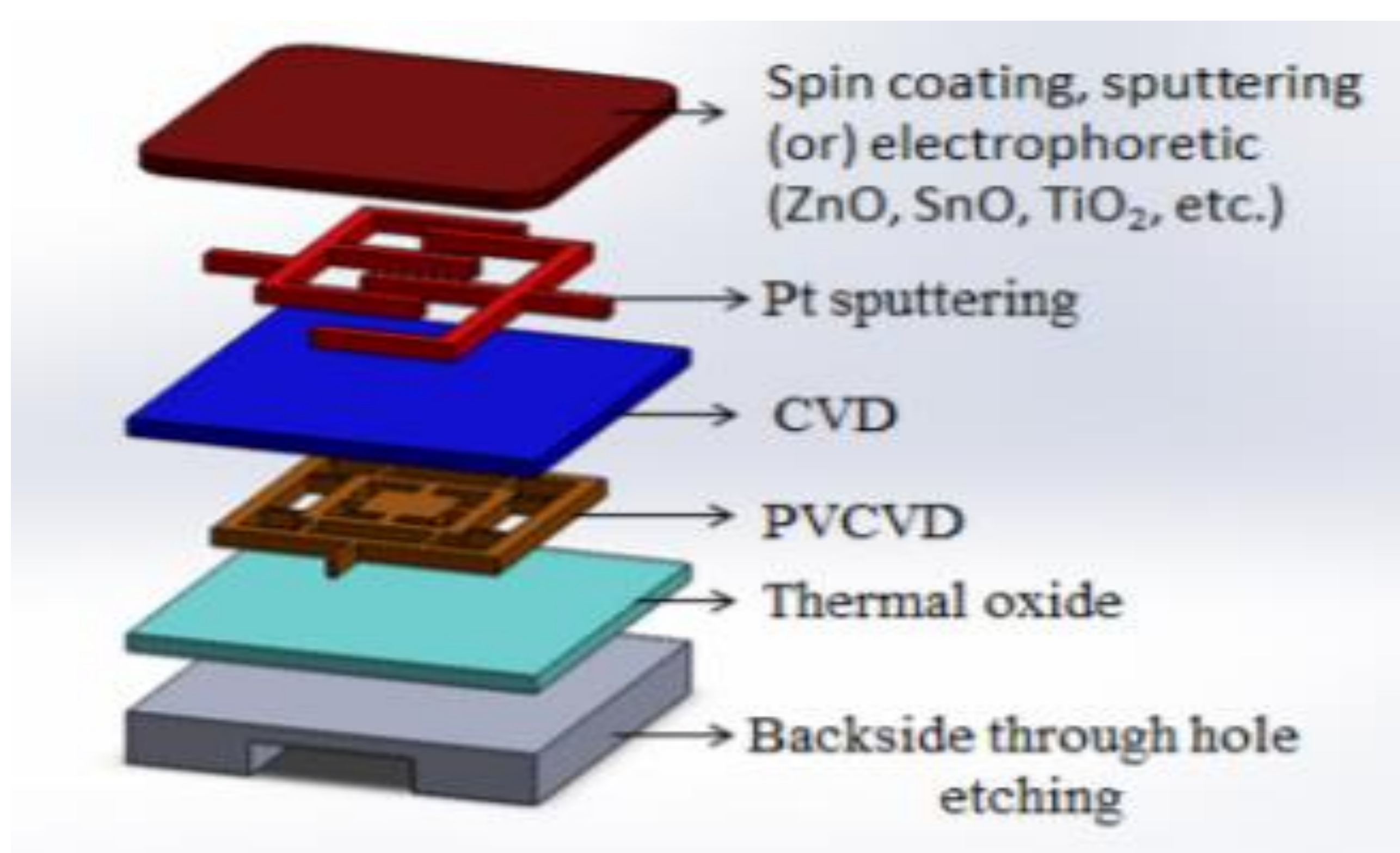


Figure 2. Nanoparticle coated MEMS based Gas Sensor

Sensing Mechanism The electron from the VOCs are trapped by the sensing layer. The oxygen ions that are chemically adsorbed at the surface of the heated sensing layer interacts with sensing layer powered by a micro heater. When ethanol vapour comes in contact with the sensing layer a chemical interaction between the ethanol and the chemically adsorbed oxygen ions occurs. This causes change in the conductance of the sensing layer.

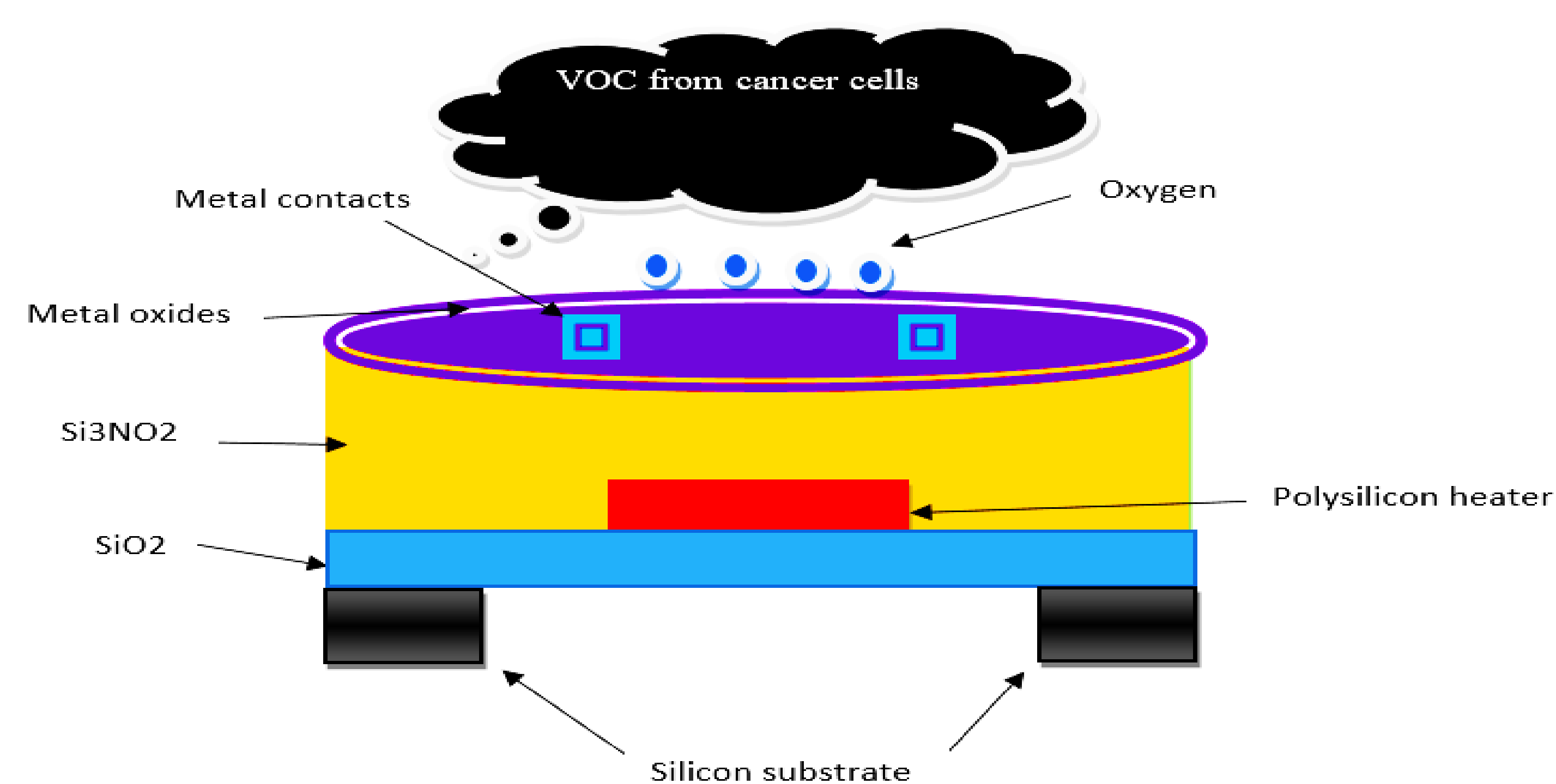


Figure 3: Gas sensing mechanism of nanoparticle coated sensing layer

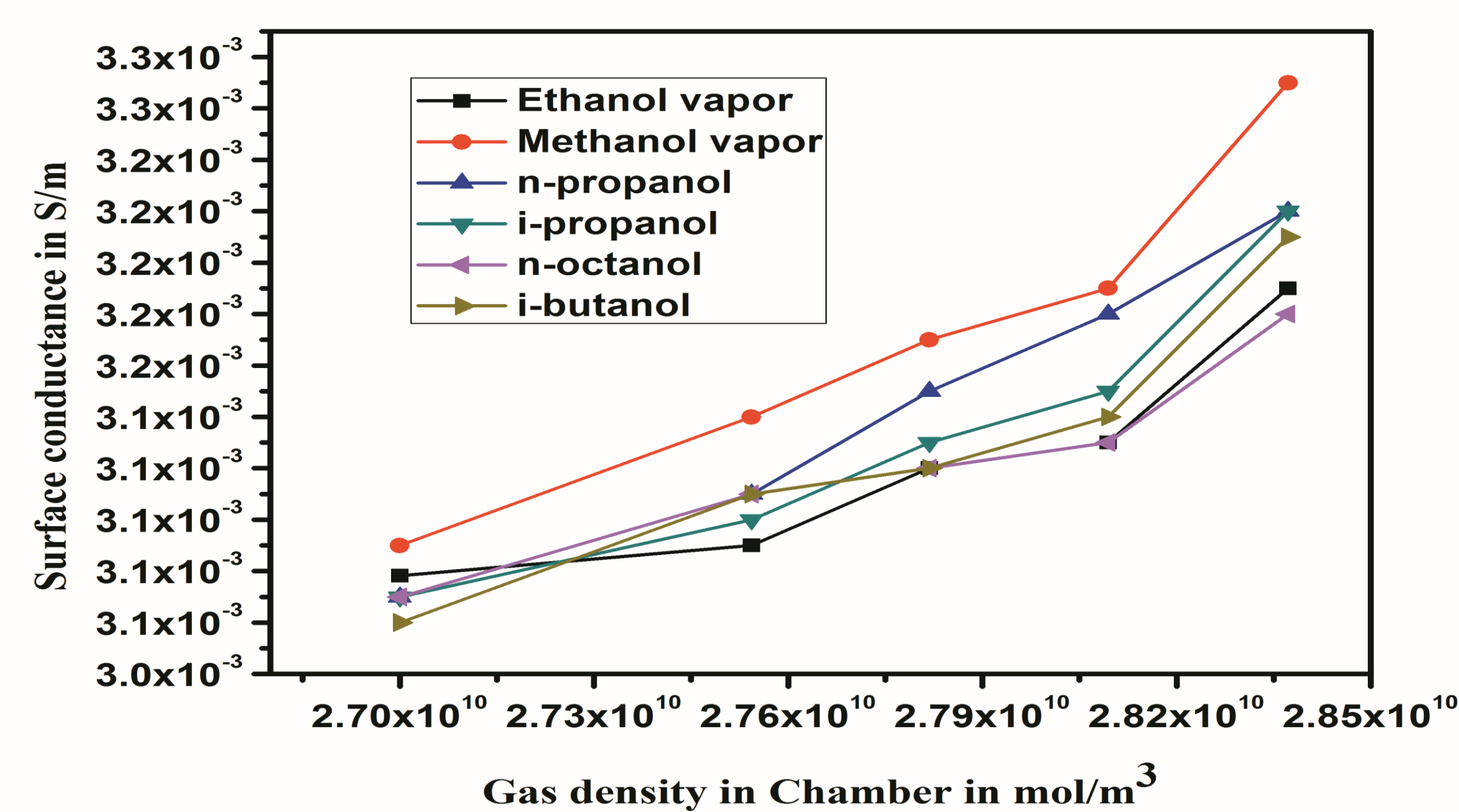


Figure 4: Gas sensor response for various alcoholic gases

Conclusion: Thus we have simulated a gas sensor which is used to detect medical abnormalities such as cancer and tuberculosis.

References:

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