

Design and Analysis of Microcantilevers for Sensor Applications

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Abstract

In this report, we present the design and analysis of micro cantilevers of various shapes and materials for different applications. Here we investigate the sensitivity i.e. amount of bending of the cantilever due to same amount of force applied to each of the shape and the respective material using a tool called COMSOL Multiphysics software. In this context we are restricted to the use of micro cantilevers in glucose sensing applications as an aid to the diabetic patients. Currently the use of micro cantilevers as sensors has been studied extensively in the areas like biomedical, consumer products, industrial needs, etc. due to its flexibility, versatility and high sensitivity. Finally we analyze the best shape and material among the others in order to enhance the sensitivity of the cantilever using graphical/statistical methods. Here we have paid a prime attention on obtaining the suitable dimension, shape and most importantly the material of the cantilever for the glucose sensing application. We put forward a prototype of a blood glucose sensor which can in turn be employed in the blood glucose monitoring system.

Reference

- 1) Suryansh Arora, et.al., "Design of MEMS based Microcantilever using Comsol Multiphysics", Applied Engineering Research, Vol.7 No.11, 2012.
- 2) Maziar Norouzi, Alireza K, "Design of Piezoelectric Microcantilever Chemical Sensor in Comsol Multiphysics Area", Electrical and Electronics, Vol.2, issue 1, No.184, 2009.
- 3) Nitin S.Kale, V.Ramgopal Rao, "Design and Fabrication Issues in Affinity Cantilevers for bio MEMS Applications", Micro Electro Mechanical Systems, VOL.15, NO.6, 2006.

Figures used in the abstract

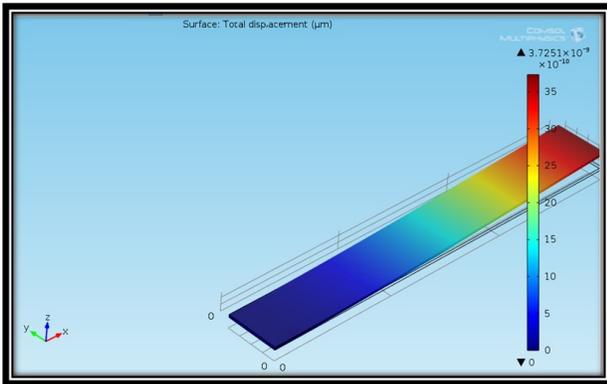


Figure 1: Stress vs. Displacement of SU8 Rectangular Cantilever.

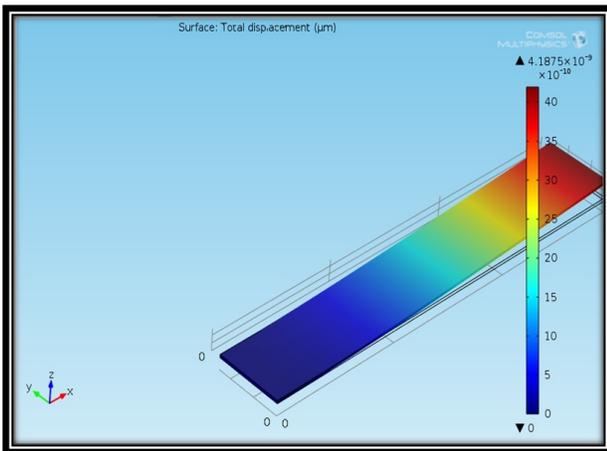


Figure 2: Stress vs. Displacement of Parylene Rectangular Cantilever.

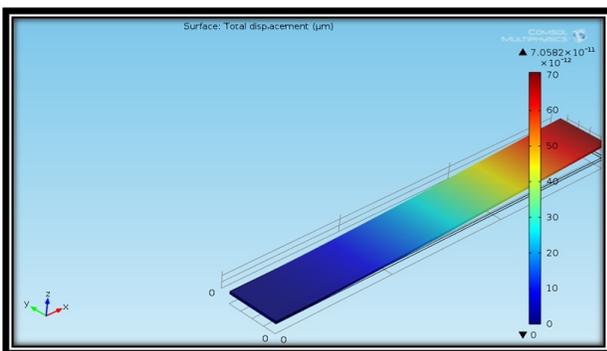


Figure 3: Stress vs. Displacement of Silicon Rectangular Cantilever.

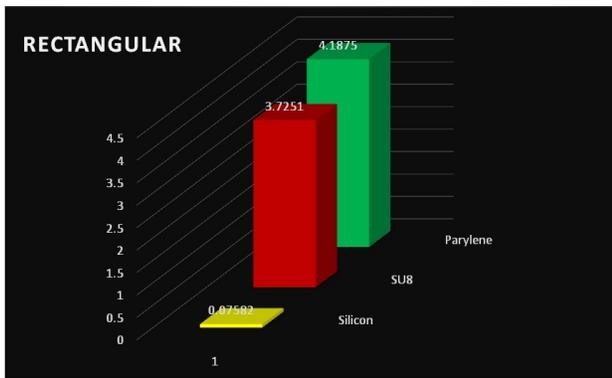


Figure 4: Displacement of Different Rectangular Cantilevers.