Chapter Four

Results and Discussion

4.1 Results

The Piezoresistive Microcantilever for Glucose Sensor was simulatedd using ANSYS (13.0). The analysis has been carried out by applying a surface pressure of 2Pa on the Microcantilever, and the corresponding displacements was noted for different thicknesses. The results are shown in Figures (4.1), (4.2), (4.3), (4.4), and (4.5).

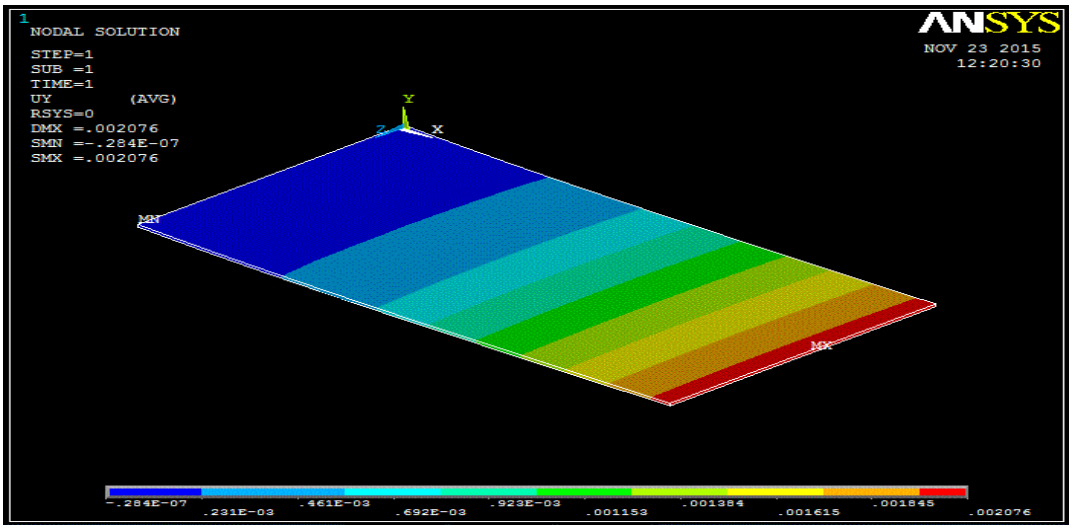


Figure 4.1: deflection of Microcantilever beam

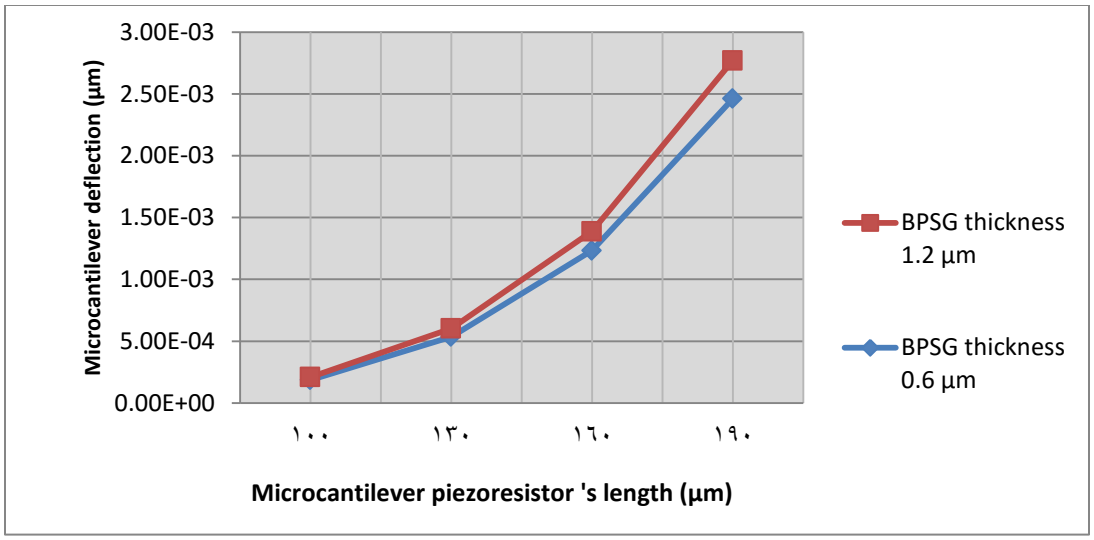
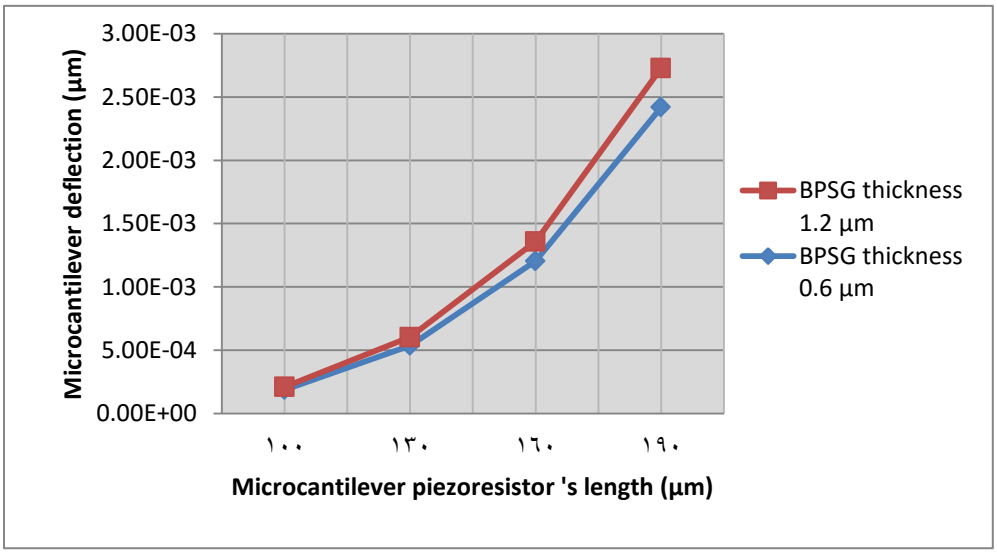
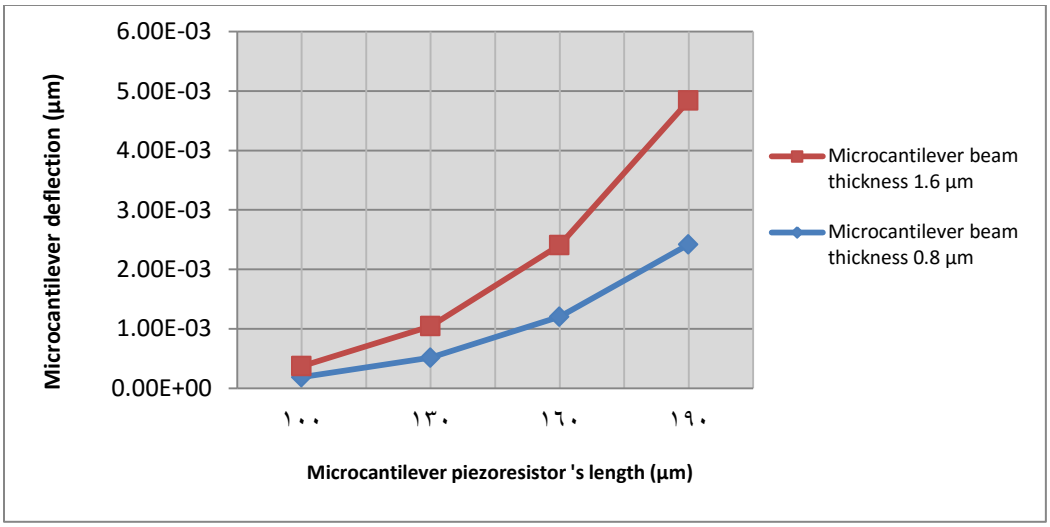


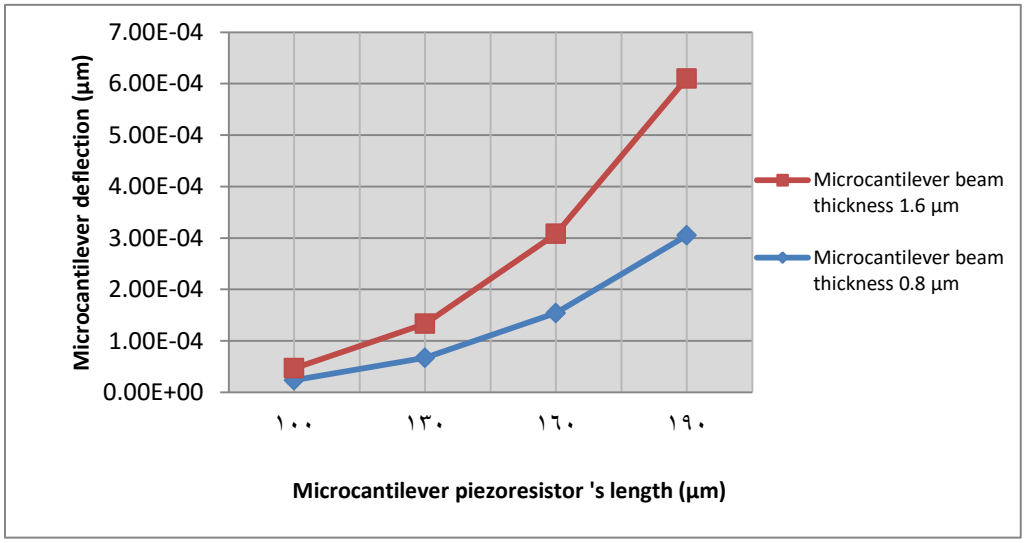
Figure 4.2: The deflection of Microcantilever beam with 0.8µm thickness for four different piezoresistor lengths and two different sacrificial layer thickness.



Figure(4.3) The deflection of a microcantilever beam with 1.6µm thickness versus the piezoresistor length.



Figure(4.4) Piezoresistive microcantilever deflection when a 2 Pascal pressure applied to the microcantilever with sacrificial layer thickness of 0.6µm with two different microcantilever beam thickness of 0.8 µm and 1.6 µm



Figure(4.5) Th deflection of Microcantilever beam sacrificial layer thickness of 1.2µm with two different microcantilever beam thickness of 0.8 µm and 1.6 µm . beam with 1.2µm thickness.

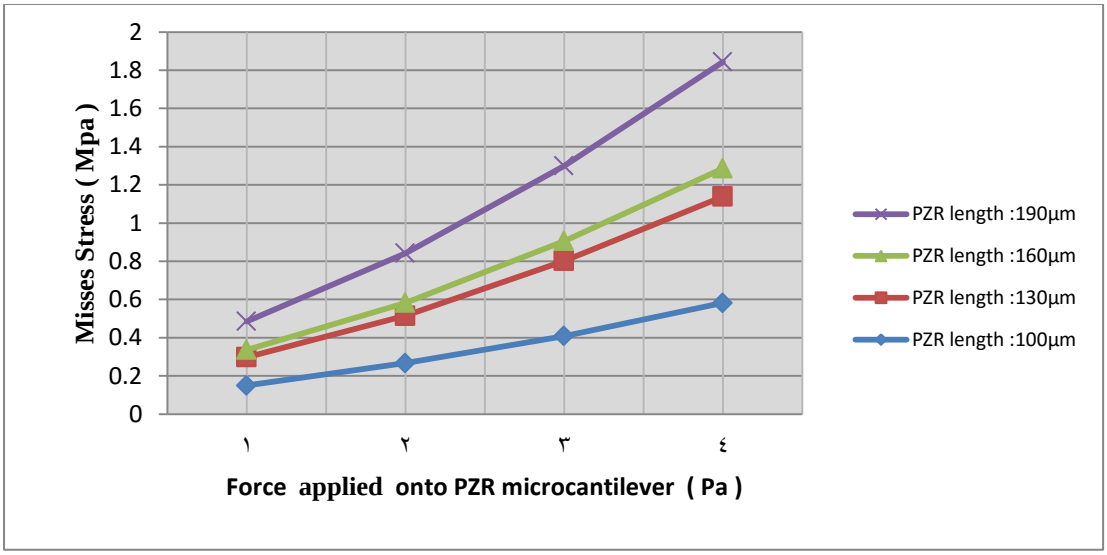


Figure (4.6) The Von-Mises Stress of PZR microcantilever with different stress

4.2 Discussion of the results

From Figure(4.2) and Figure(4.3) above, it can be observed that, when a 2Pa force applied onto the microcantilever, the microcantilever deflection is higher for the 0.8µm thick microcantilever compare to the 1.6µm thick microcantilever. By comparing with the layer thickness, the the microcantilever with the least thickness produces the higher deflection value. For both microcantilever thickness, as the piezoresistor's length increases the deflection is also increases.

From Figure (4.5) with a layer thickness of 1.6µm, the microcantilever beam with 0.6µm thickness also shows the larger deflection when compared to the microcantilever beam with 1.2 µm thickness. However, the different in these two graphs is that the layer with the least thickness at 0.8 µm have the largest deflection at approximately 0.013 µm for piezoresistor length at 170 µm for microcantilever beam thickness at 0.6 µm . For the layer of 1.8 µm, the maximum deflection is at 0.00348 µm when the piezoresistor length is 140 µm.