

“Design and development of MEMS based sensor for blood group detection”

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Agenda

- Introduction
- Detailed design
- Conclusion and future scope
- References

Introduction

- Blood group investigation is the most common test performed very frequently under different circumstances.
- This lead to the design of MEMs based cantilever structure intended for blood group detection.
- A sensing layer (antibodies) which when comes in contact with blood sample (antigens) results in coagulation. Due to this effect the cantilever deflects and indicates particular blood group.

Objectives

- Blood group detection kit should be environmentally benign.
- Must give results quickly
- It should be portable(handy)
- Should be inexpensive
- Can be easily distributed

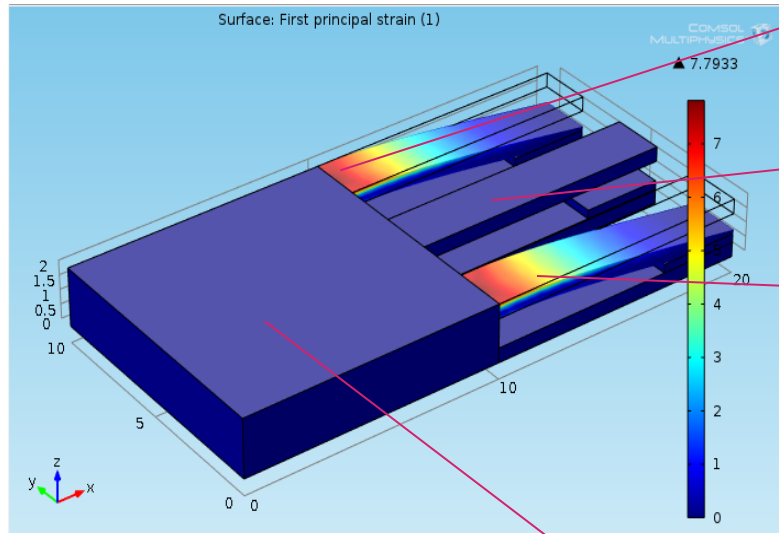
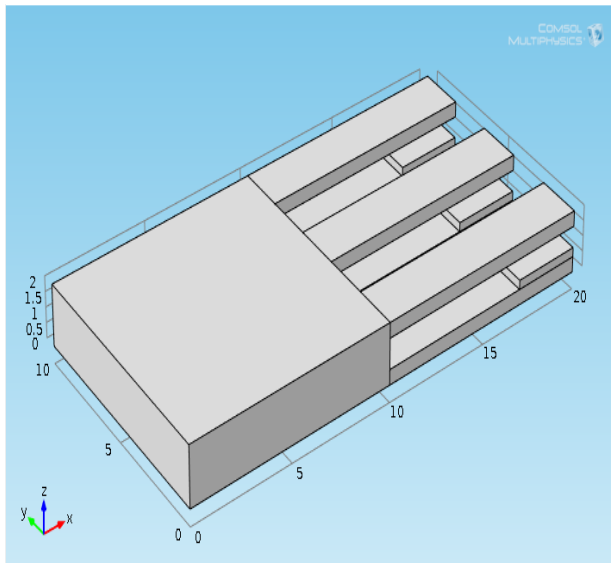
Attributes

- Quick results
- Flexibility
- Economy
- Portable
- In vitro
- User safety
- Eco friendly

Constraints

- Size of the device
- Determination of RBC's, WBC's and platelets count quantitatively
- Layer sensitivity
- Environmental factors

Sensor design in COMSOL Multiphysics 4.2



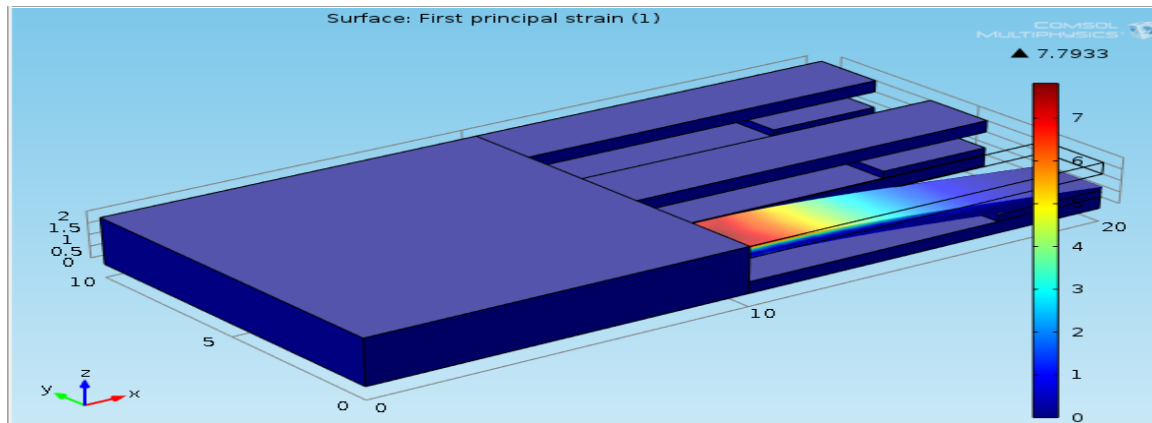
Anti D reagent
2,4 dinitrophenol
Anti B reagent
Anti A reagent

Fig5.sensor model

Cantilever base

Stress variation in A- blood group

Stress	Deflection
0.01	0.7
0.02	0.5
0.03	0.4
0.04	0.3
0.05	0.2
0.06	0.1
0.07	0



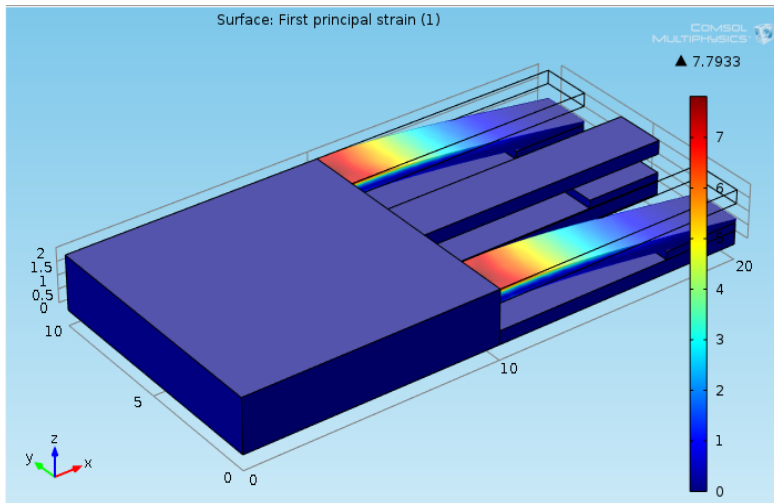


Fig.7. A+ blood group

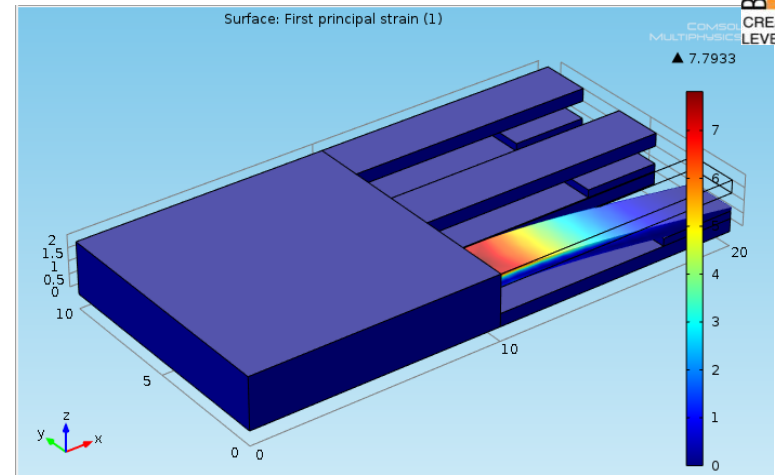


Fig.8. A- blood group

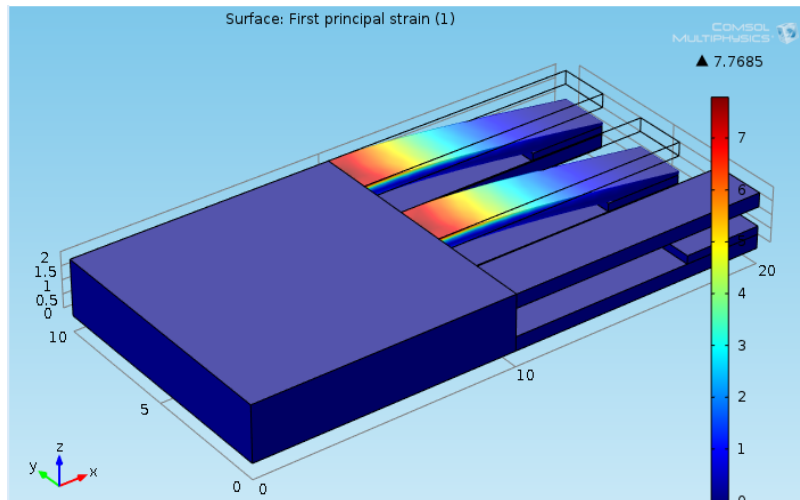


Fig.9. B+ Flood group

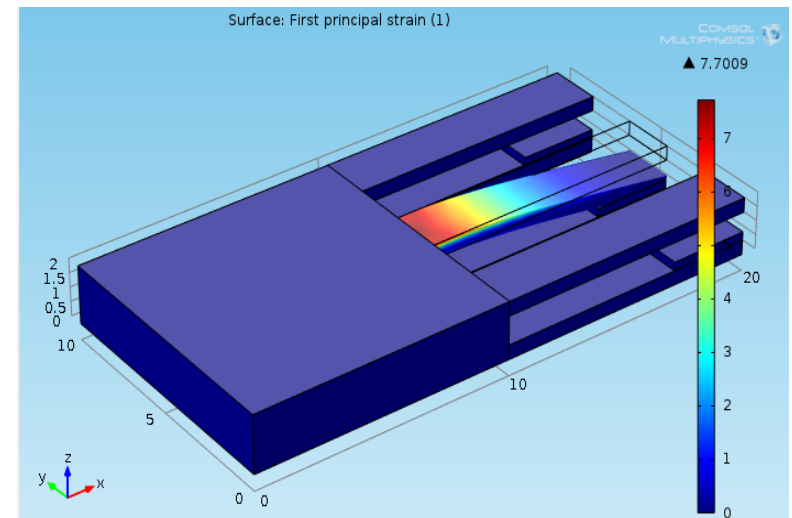


Fig.10. B - blood group

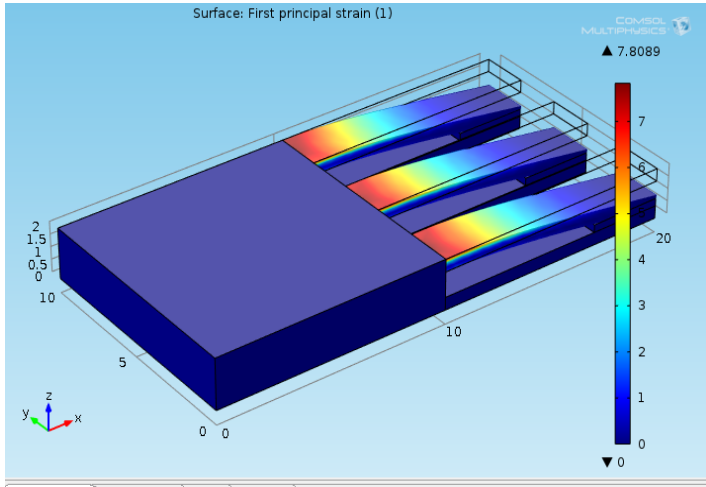


Fig.11. AB+ blood group

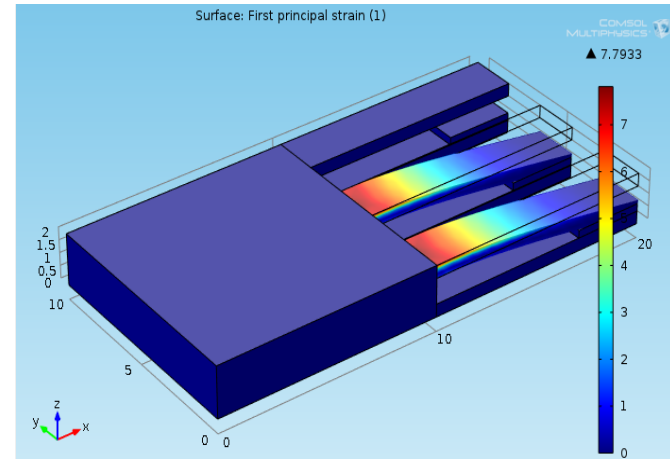


Fig.12. AB - blood group

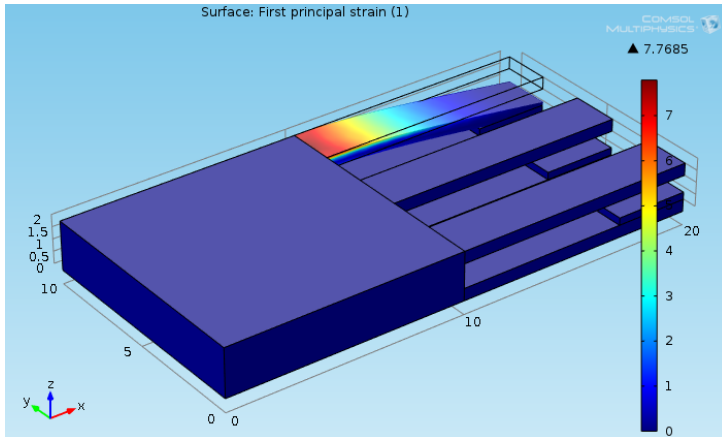


Fig.13 O+ blood group

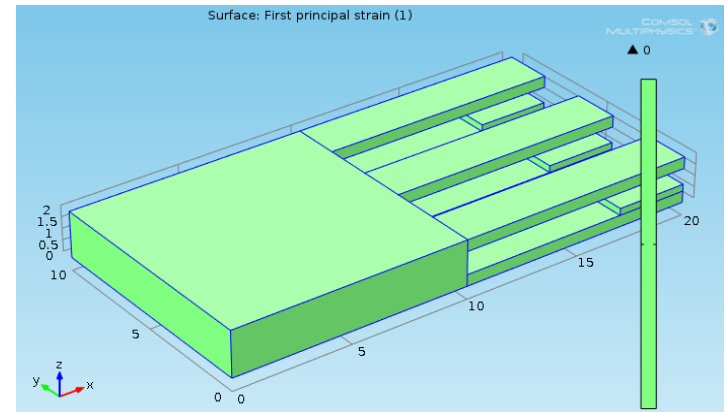


Fig.14. O- blood group

Display

Blood group	First cantilever	Second cantilever	Third cantilever
A+	1	0	1
A-	1	0	0
B+	0	1	1
B-	0	1	0
AB+	1	1	1
AB-	1	1	0
O+	0	0	1
O-	0	0	0

Conclusion

- Blood group detection sensor is a device, which gives electrical output and can be measured easily.
- Using this we can get quick results

Future scope

- The application can be extended to count the RBC's ,WBC's and platelets.
- Durability of product can be improved

References

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- 2. “A prototype for blood typing based on image processing” by Ana Ferraz, Filomena soares, R & D centre , Algoritmi ,University of Minho, Portugal.
- 3. “A novel approach in identification of blood group using laser technology”,by Priyadarshini, Ramya, kalayvarasi, kalpana, suthathira, Tamilnadu, India.
- 4. “current technology of chlorine analysis for water and waste water” by Danial.L.Harp.

Thank you