

Lab 10: BioMEMS force sensor

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Summary

We will be showing a bioMEMS force sensor and its application in measuring stretch and compression force response of healthy and malaria-infected human red blood cells. The bioMEMS force sensor is made from pure single crystal silicon, and consist of a probe and flexible beams. The probe is used to contact, indent and stretch the cells, and the flexible beams to measure the cell force response. The probe is about 5 μm wide and 5 μm deep. Each of the flexible beams is about 2 mm long, 1 μm wide and 5 μm deep. We will show how to manipulate the sensor and bring it in contact with the cells, and how the cell force response is measured. Every student will have the chance to try out this manipulation process. Two particular cell force response measurements will also be shown: a poly-L-lysine coated sensor probe will be used to measure (1) the stretch force response of a healthy red blood cell and (2) the compression force response of a malaria-infected red blood cell. For more information about this bioMEMS technique, please refer to the following two papers:

Recommended Reading

S. Yang and T. Saif, "Micromachined force sensors for the study of cell mechanics," *Rev. Sci. Instrum.* **76**.

S. Yang and T. Saif, "Reversible and repeatable linear local cell force response under large stretches," *Exp. Cell Res.* **205**.

