



Stretchable Pluse Oximeter

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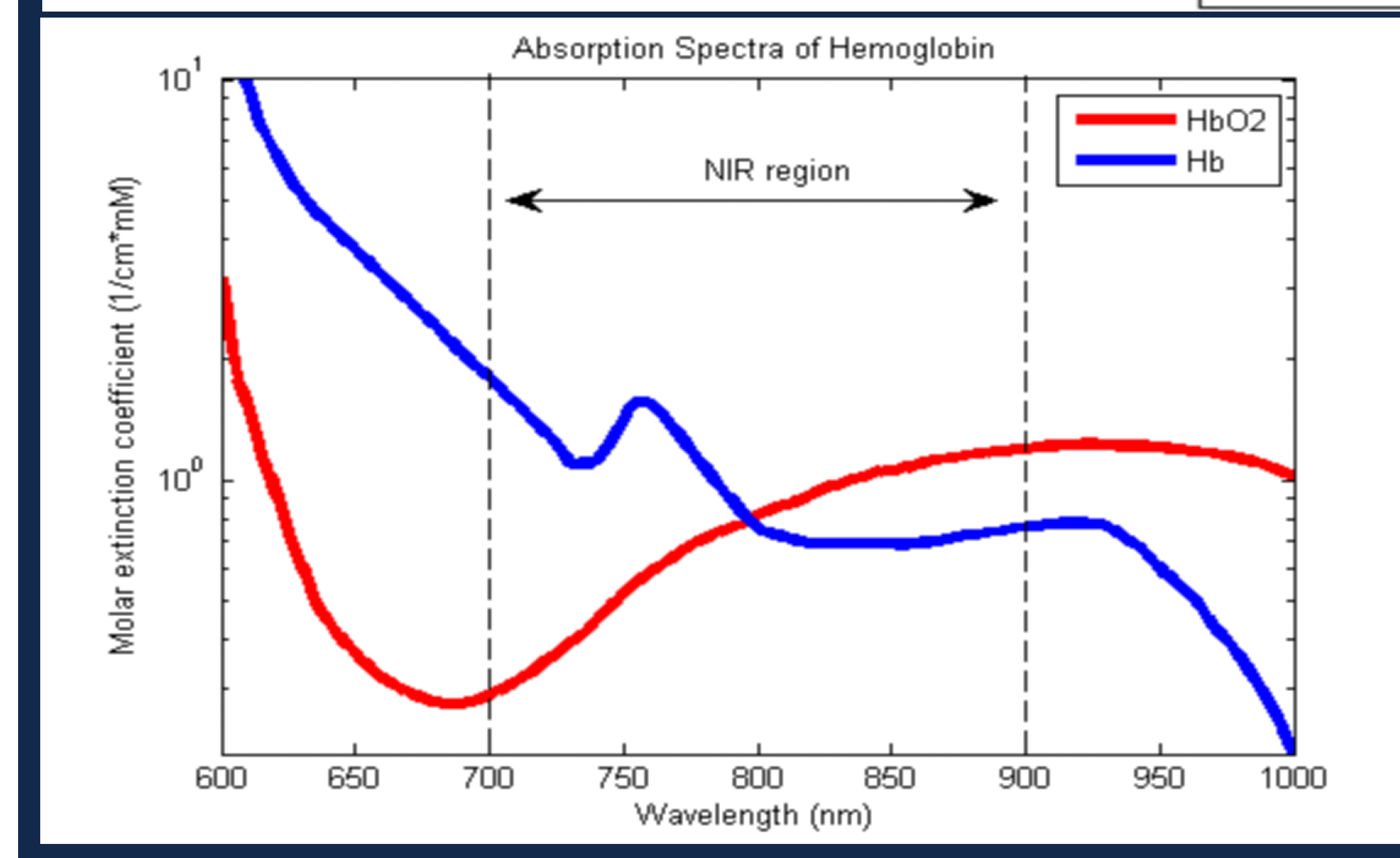
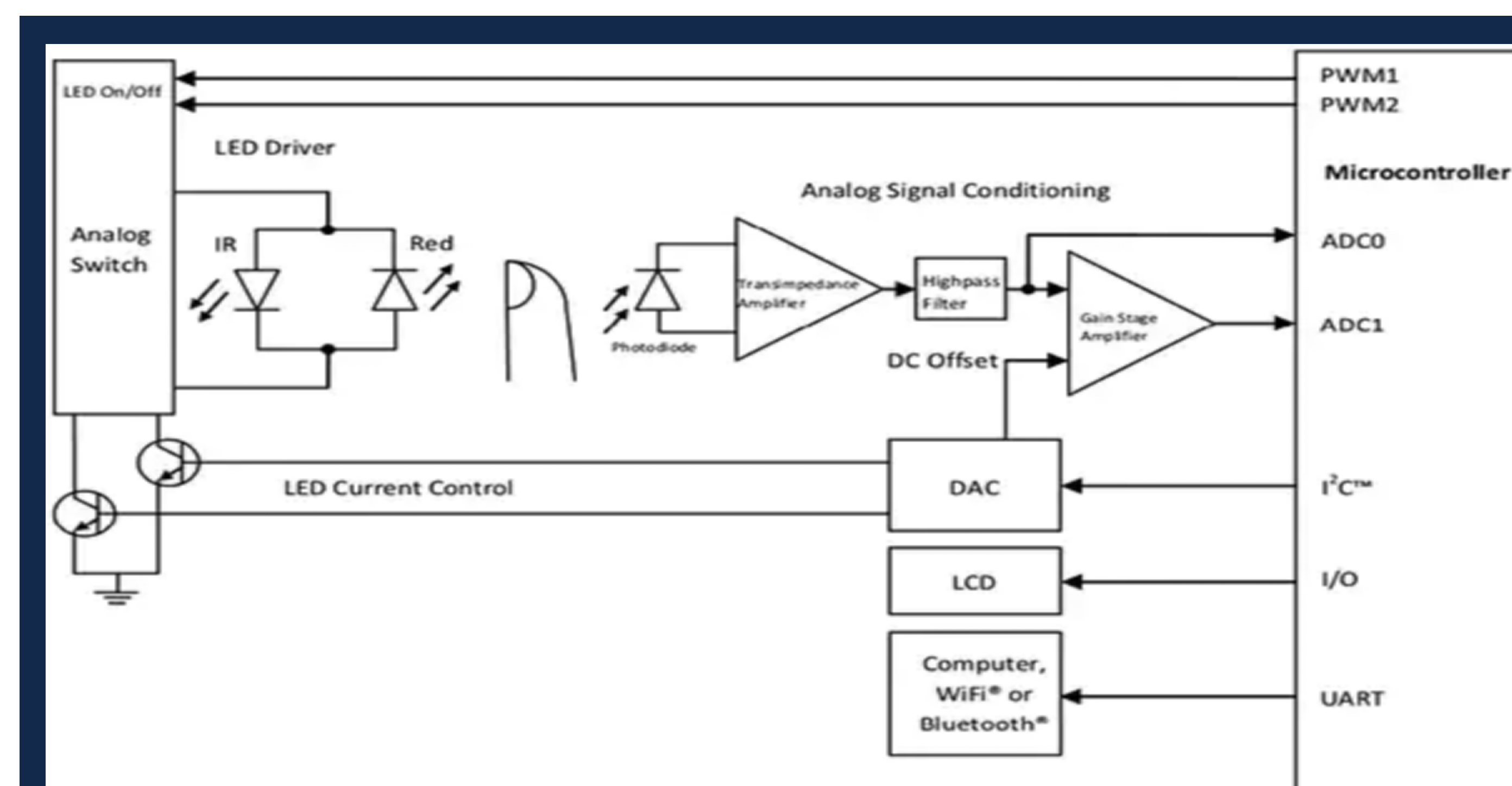
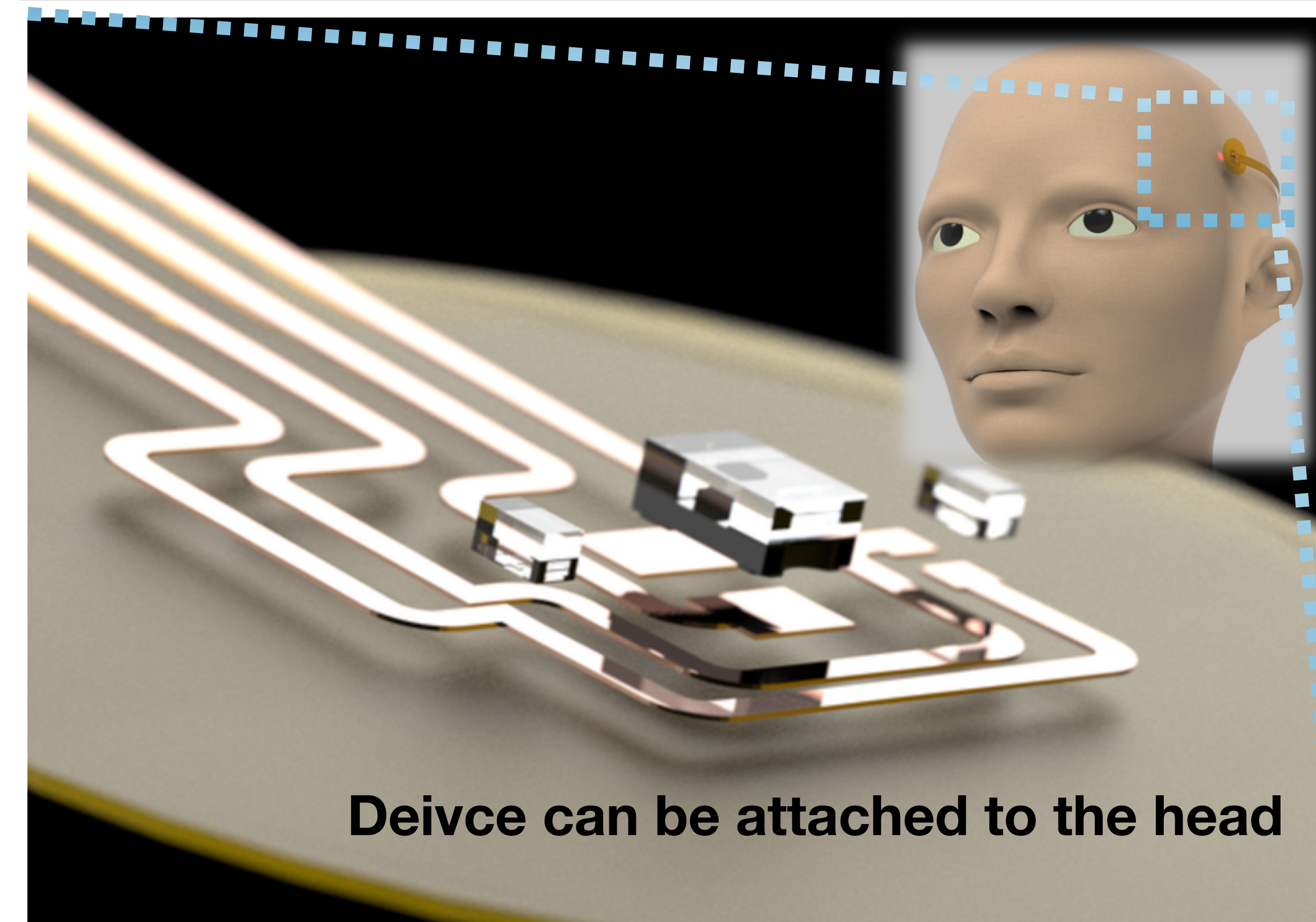
Abstract

A modified oximeter design is presented, mainly consisting of red LEDs, near-infrared LEDs, photodiodes, and an Arduino Nano with an analog-to-digital converter (ADC) to improve the measurement performance of the oximeter during human motion stability and accuracy. In order to solve the problem that the traditional oximeter does not fit tightly with the skin during exercise, this solution adds a layer of polydimethylsiloxane (PDMS) material to the oximeter to enhance its adhesion to the skin. The utility of PDMS was demonstrated by measuring the adhesion of the material. In order to further optimize the design, in the future, flexible PCB boards will be used to replace the current rigid PCB boards to make the oximeter scalable. This study provides an effective solution to improve the reliability and accuracy of oximeters in dynamic environments.

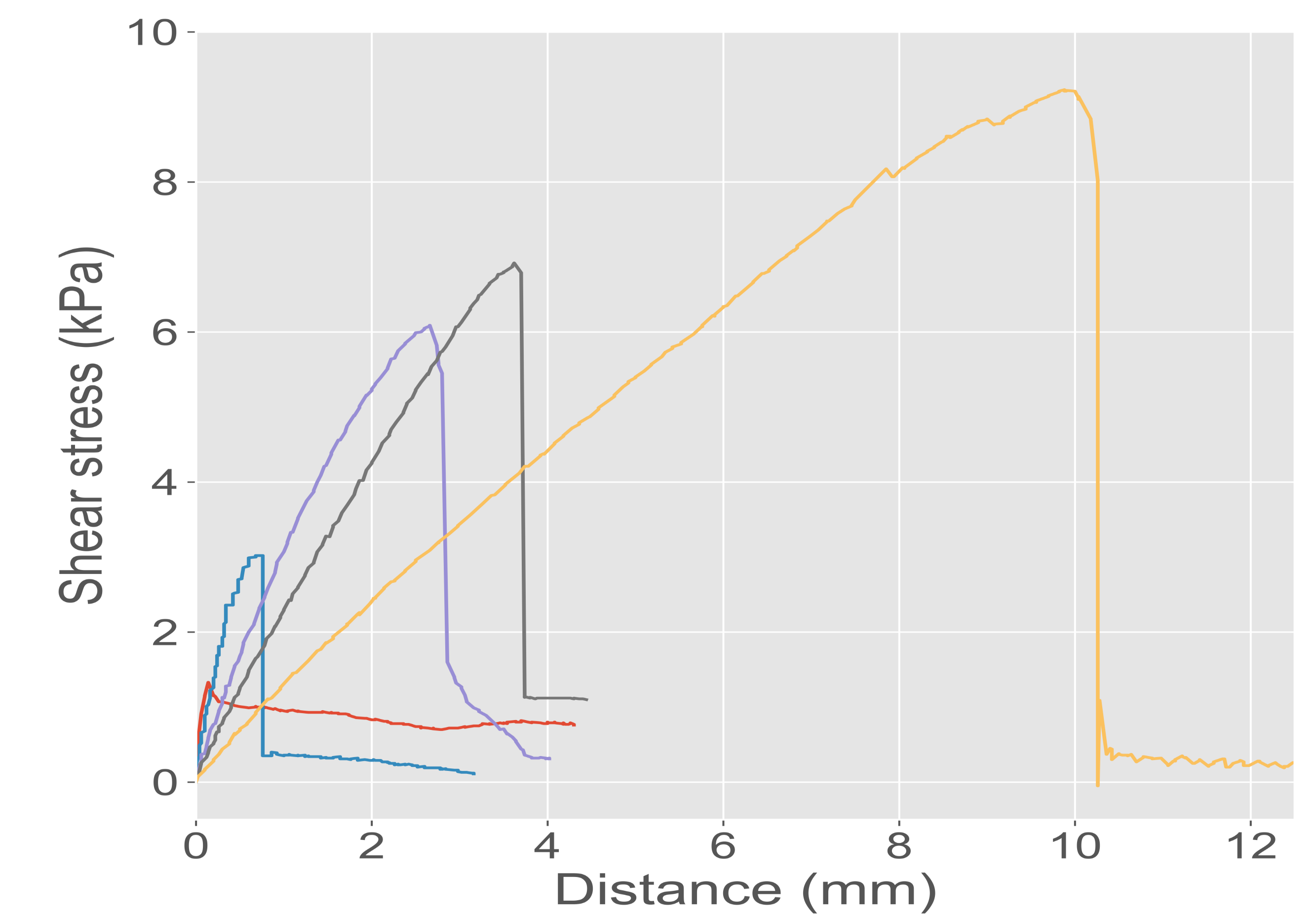
Method

- Circuit Design
 - Arduino Nano (ADC)
 - Red LED
 - Near-Infrared LED
 - Photodiode
 - Amplifier (High-Pass Filter)
 - Passive High-Pass Filter
- Stretchable and Adhesive Materials
 - PDMS Sylgard 184
 - Stretchable PCB (Designing and Creating)
- Algorithm
 - $SpO_2 = HbO_2 / (HbO_2 + Hb)$

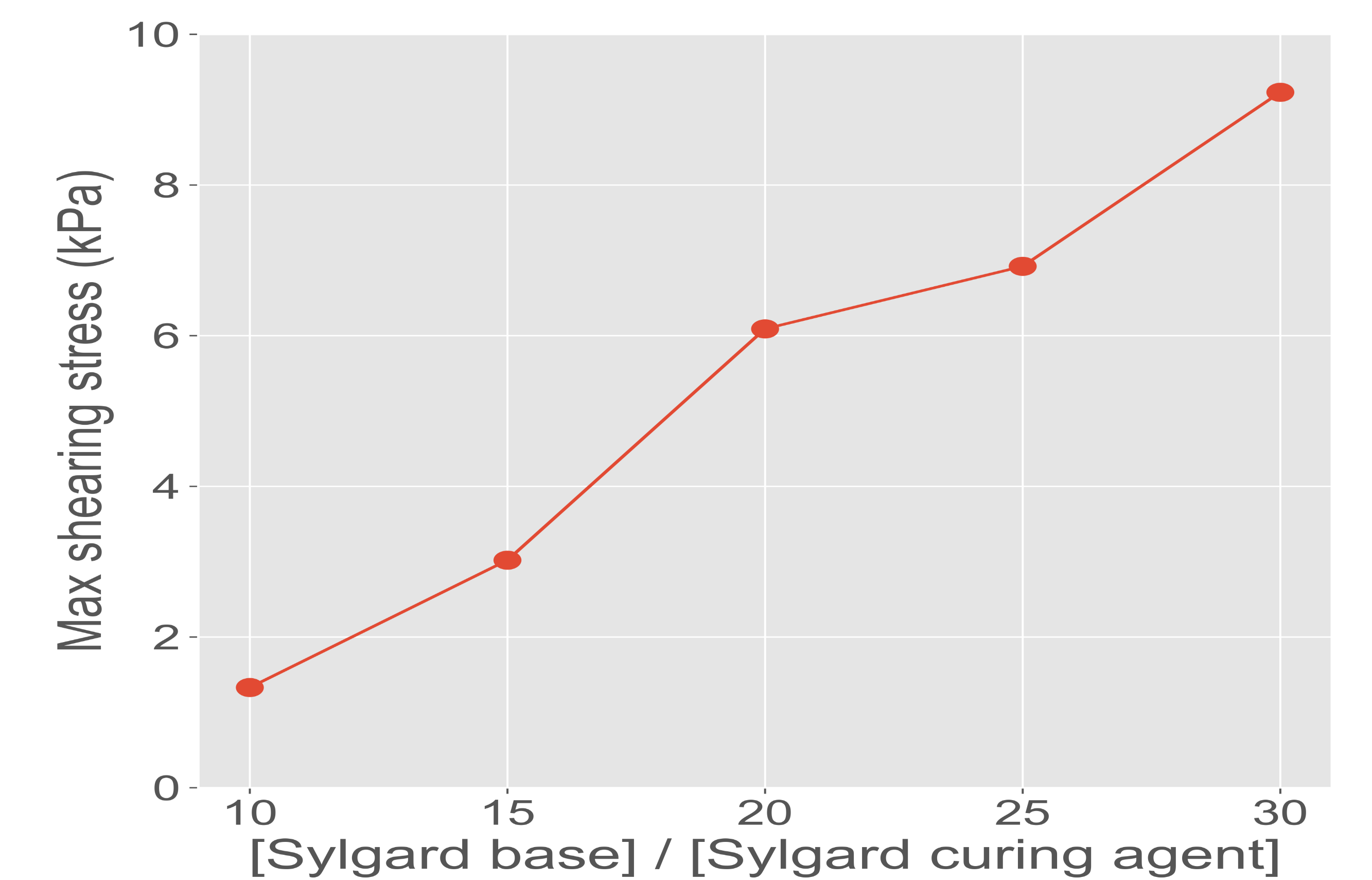
Design



Result



The Maximum Shear Stress(kPa) and Stretchability in various PDMS and Curing Agent ratio.



The Relation Between PDMS Sylgard and Sylgard Curing Agent

References

- Digi-Key (Circuit)
- ScienceDirect(Polydimethylsiloxane-PDMS)