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Biomedical Sensing Approaches to Arterial Pulse Monitoring: Wearable Pressure and Optical Solutions

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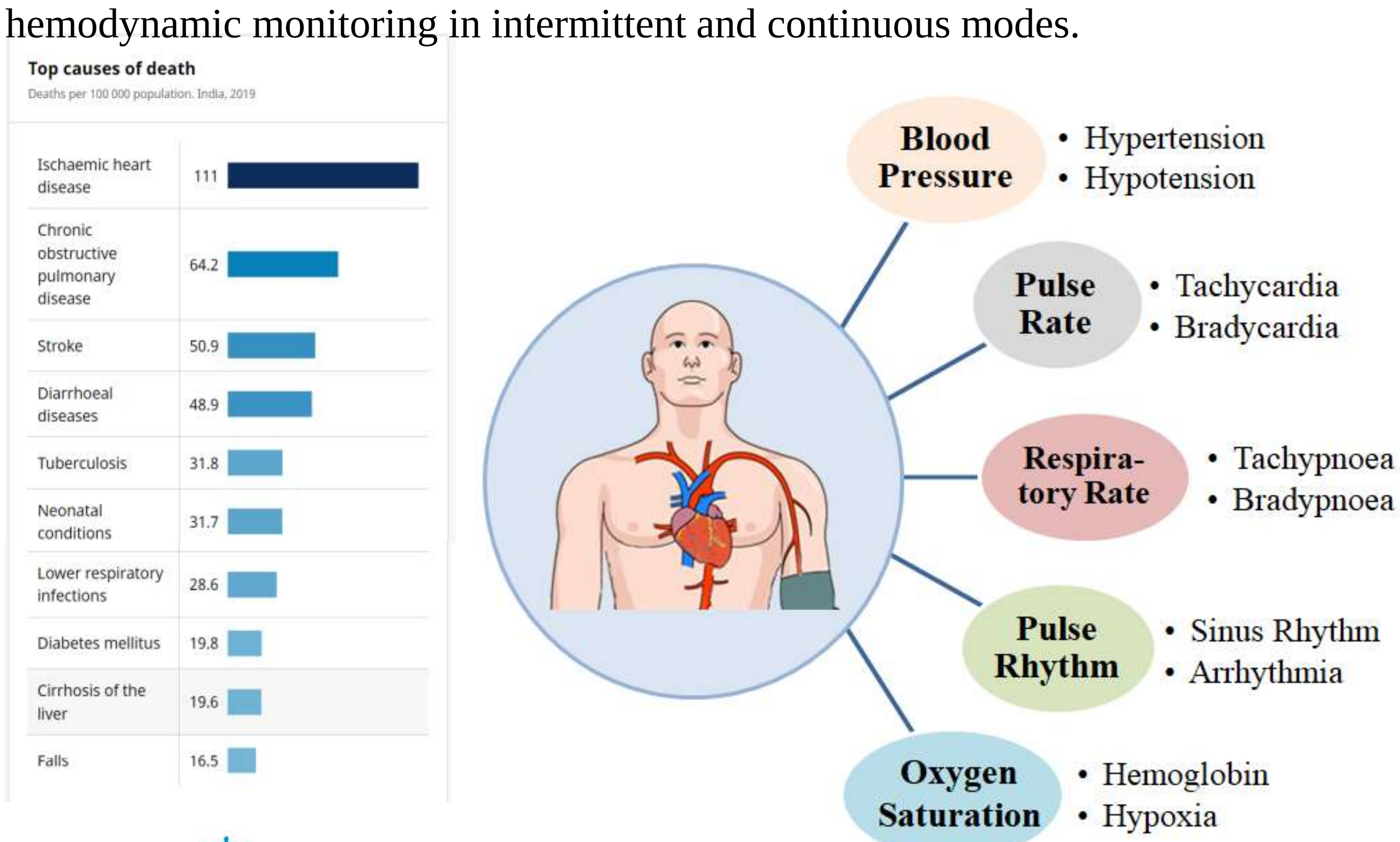
INTRODUCTION & AIM

Physiological monitoring of the heart is essential to know what condition of our heart is going through. In this regard, wearable pressure and optoelectronic devices have received significant interest towards flexible and wearable healthcare applications such as pulse rate, blood oxygen level, respiration rate, and blood pressure monitoring. Therefore, we have developed a flexible capacitive-based pressure sensor and an organic photoplethysmography sensor for hemodynamic monitoring in intermittent and continuous modes.



Reference: World Health Organization

METHOD

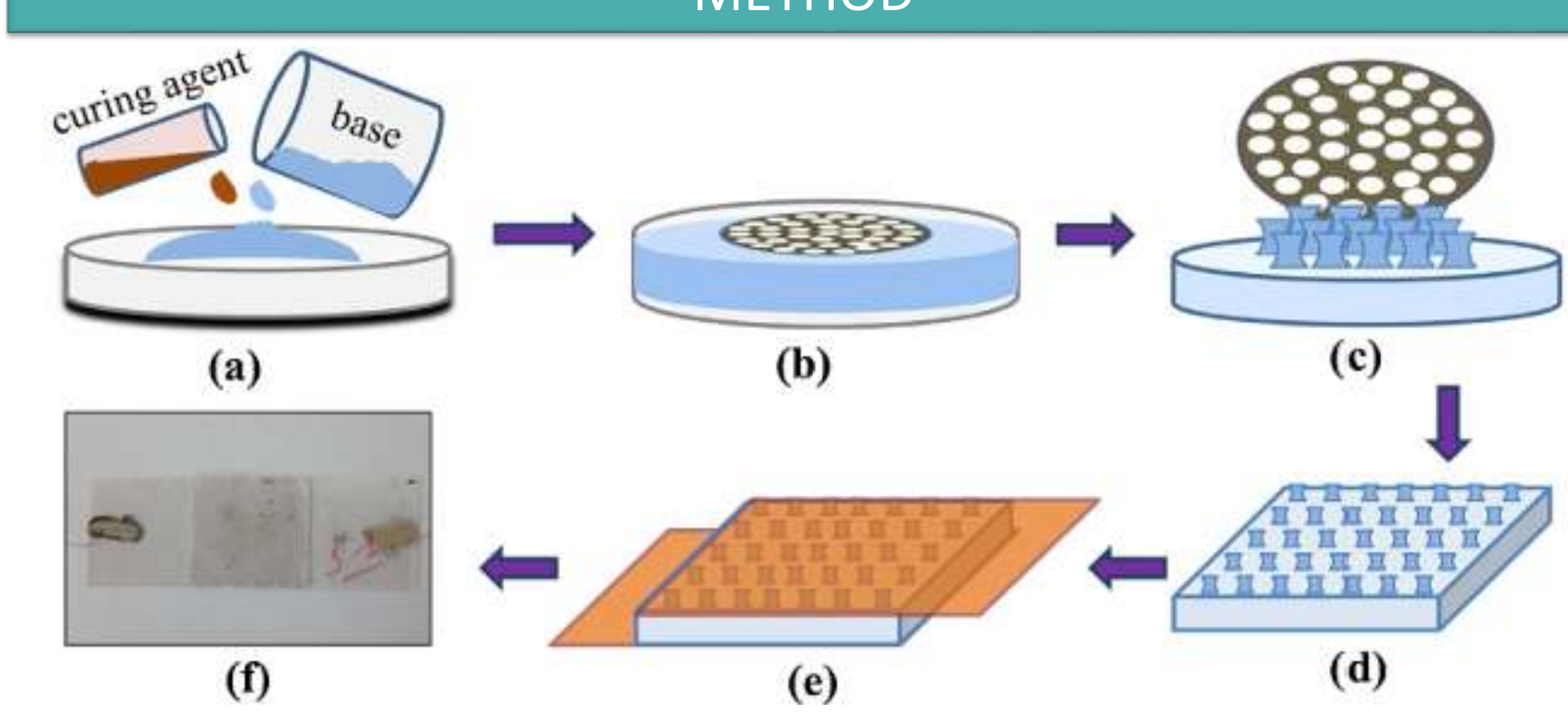


Figure- Schematic diagram of the fabrication steps of the pressure sensor.

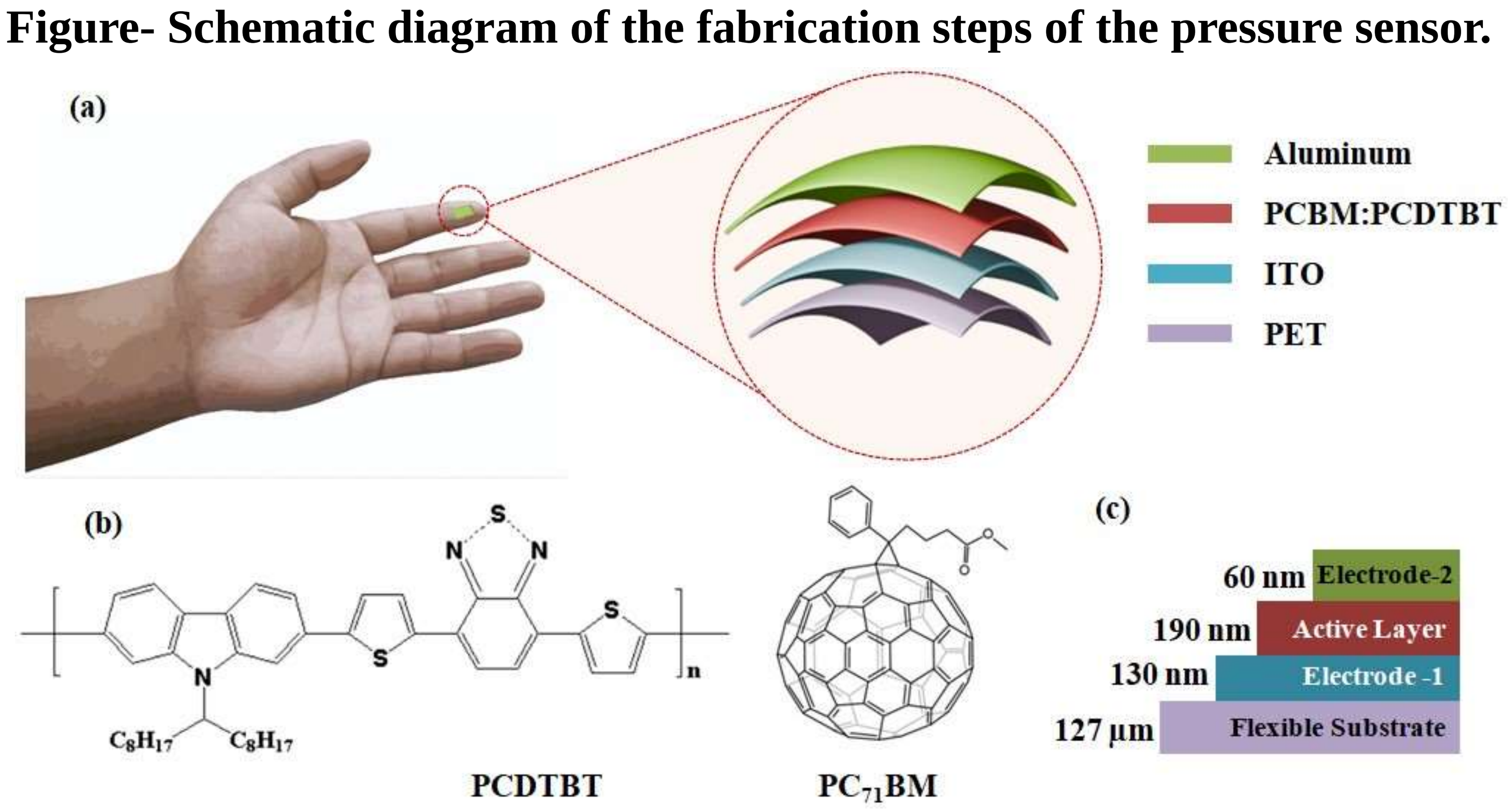


Figure- Schematic diagram of the flexible organic PPG sensor.

RESULTS & DISCUSSION

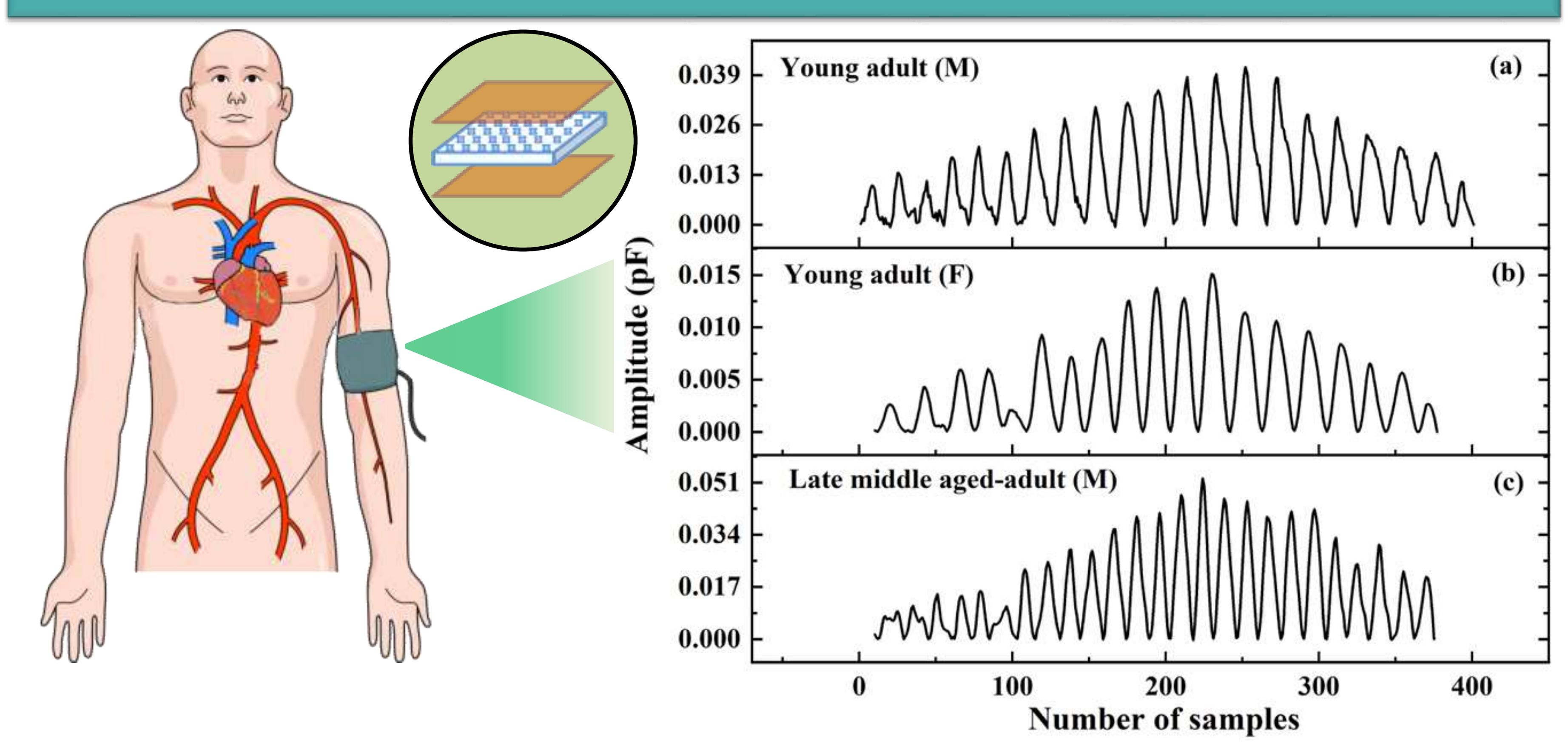


Figure- Oscillometric waveform of different volunteers.

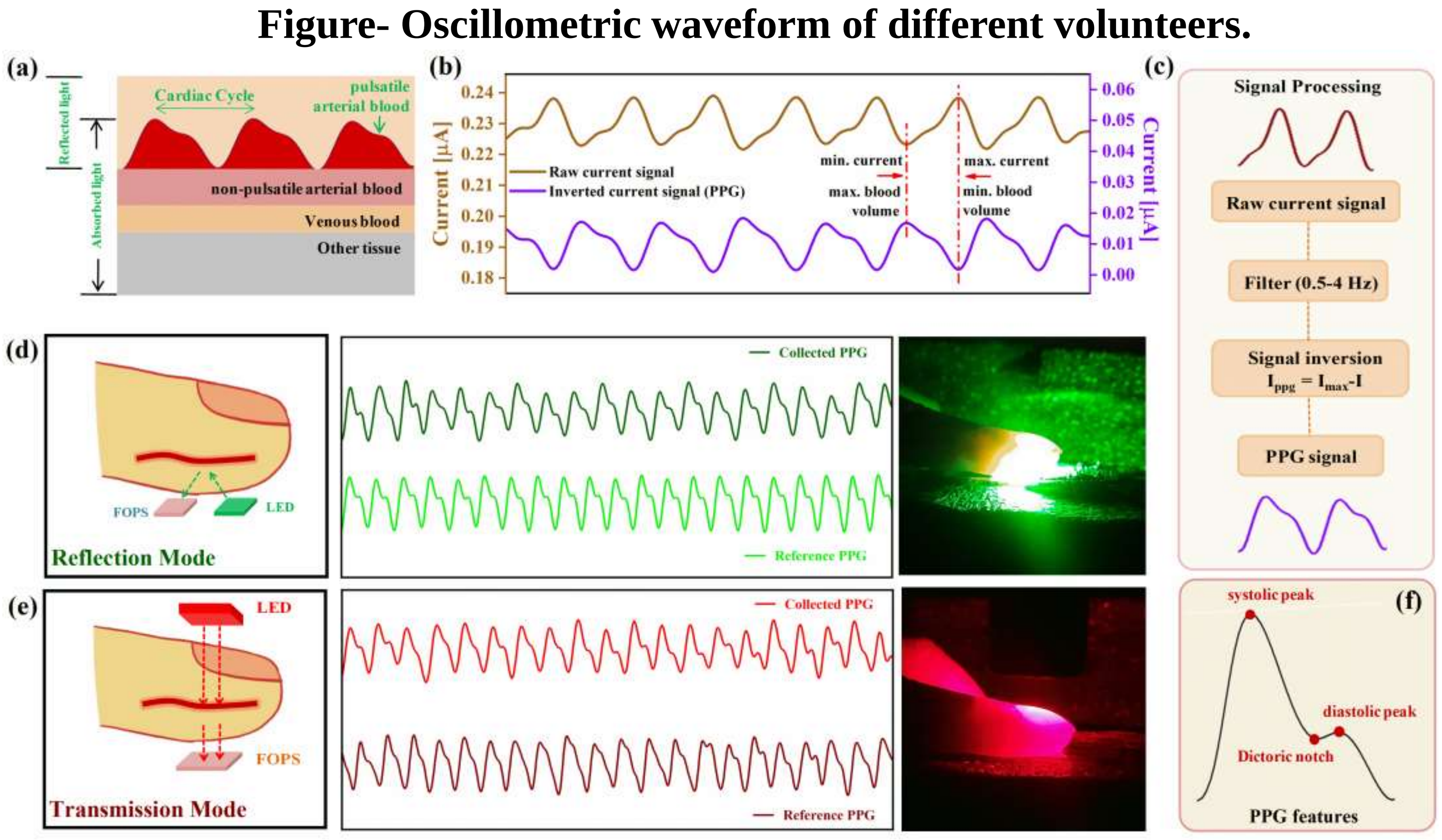


Figure- Arterial pulse monitoring in reflection and transmission mode.

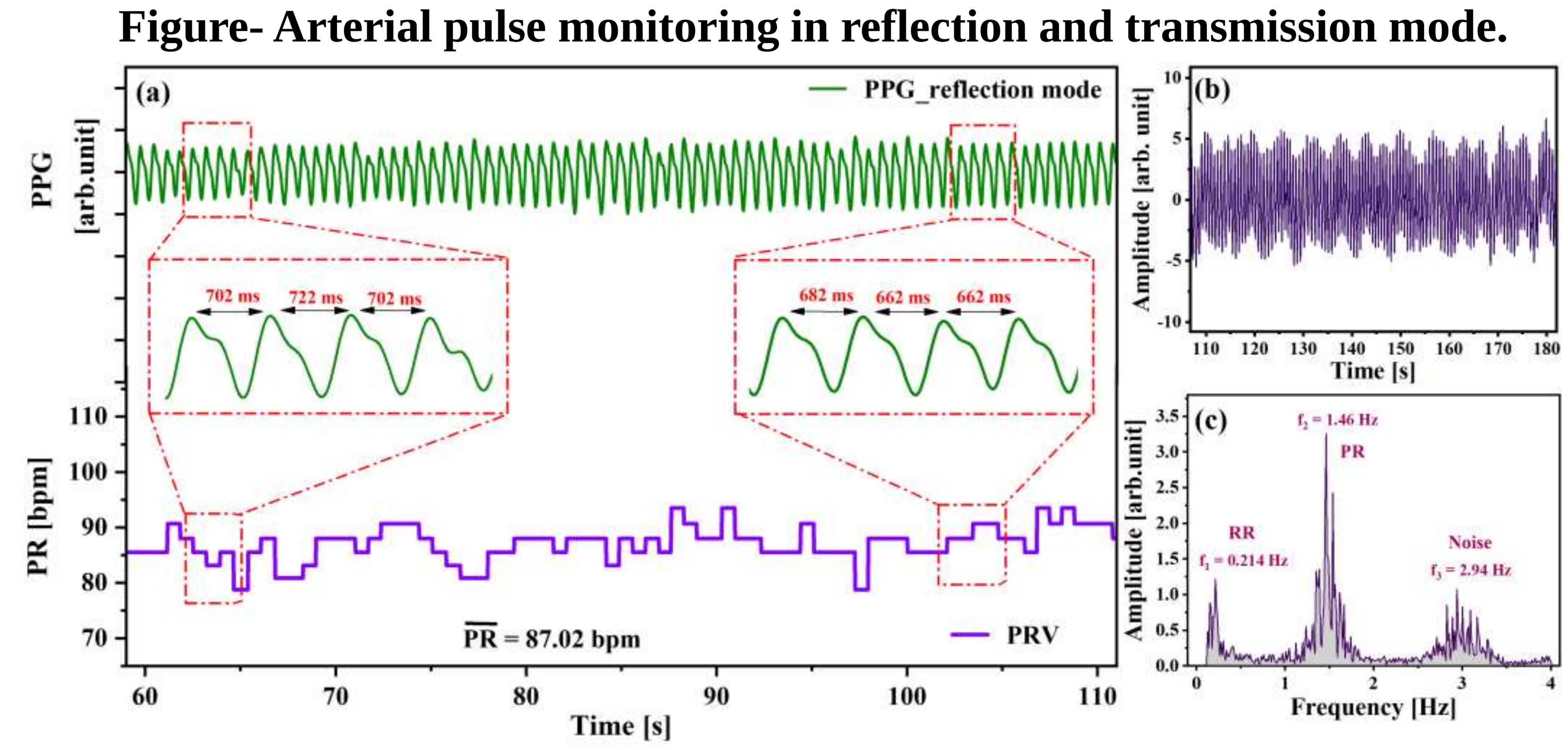


Figure- Pulse rate, pulse rate variability, and respiratory rate measurement.

CONCLUSION

- ✓ A microstructured capacitive mechanism-based flexible pressure sensor and a flexible organic PPG sensor are fabricated.
- ✓ The sensor can detect the oscillometric waveform from the brachial artery.
- ✓ The pressure sensor is capable of measuring hemodynamic parameters such as blood pressure and pulse rate.
- ✓ The flexible PPG sensor can detect the PPG signal from the proper digital artery.
- ✓ The flexible PPG sensor is capable of measuring hemodynamic parameters such as pulse rate, respiration rate, and pulse rate variability.
- ✓ Additionally, the PPG sensor is able to measure blood pressure using the artificial neural network approach.

REFERENCES

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(3) S. Kumar et al., Biomedical Engineering Advances. 6 (2023) 100100.