Electronic Supplementary Material (ESI) for Lab on a Chip.

Lateral Flow Assay with Pressure Meter Readout for Rapid Point-of-care Detection of Disease-associated Protein

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Gas-tight container

As shown in Figure S1, the lid of the gas-tight container has eight holes corresponding to the eight-well ELISA plate (Jet Bio, China) inside. Each of gas-tight container with an eight-well ELISA plate inside can hold up to eight samples simultaneously. A piece of rubber strip was used as a sealing tool. When the sealing rubber strip covered the eight-well ELISA plate, the height of the sealing rubber strip was a little higher than the edge, so the sealing of the container can be ensured when the lid was closed. By inserting the tip of a handheld pressure meter into the sealed container through the rubber strip, gas pressure was easily readout.

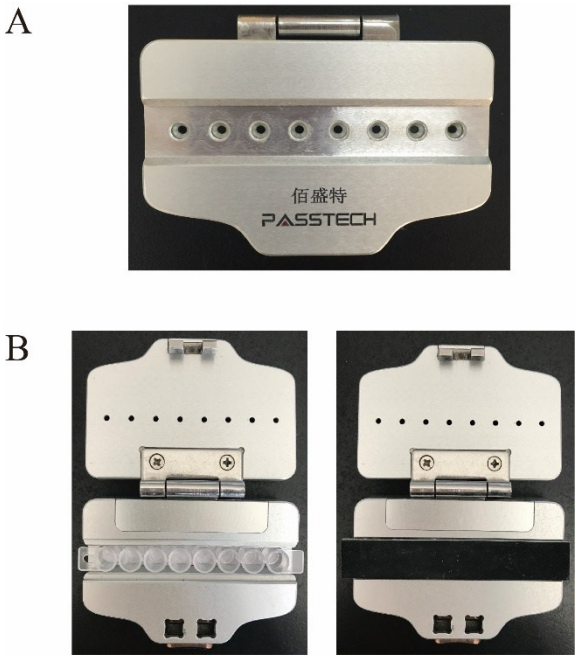

Figure S1. The image of gas-tight container. A) The outside view of gas-tight container. B) The inside image of gas-tight container with eight-well ELISA plate and rubber sealing strip respectively

Handheld pressure meter

As shown in Figure S2, the handheld pressure meter consists of a lithium battery for continuous measurement, a LCD display for displaying air pressure, and the low-cost digital atmospheric pressure sensor. The sensor was fitted with a 0.7 mm needle for air pressure measurement. The detection range of handheld pressure meter was 0-3000 Kpa with accuracy of 0.01 Kpa. When measuring, the needle of handheld pressure meter was inserted into the closed chamber through the rubber sealing strip for detection and

the pressure value was read out through the display. The costs for gas-tight container and handheld pressure meter are about 30 and 21 US dollars, separately. They do not contribute to the overall assay costs because they are reusable. The only disposable consumable is an 8-well ELISA plate, which costs less than 1 cent per sample.

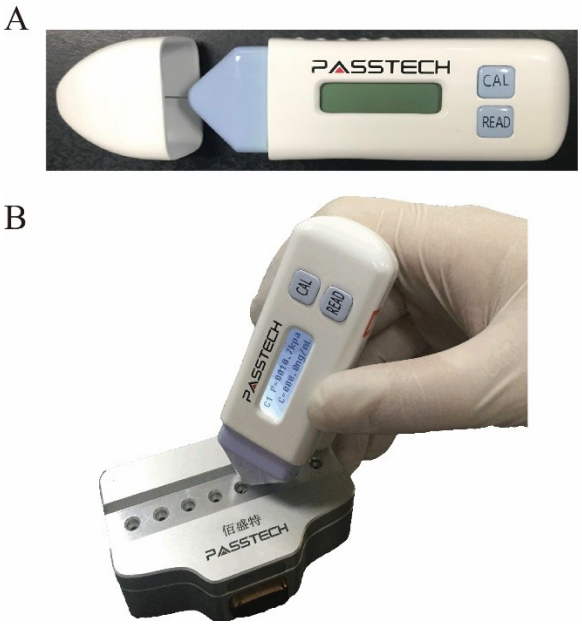

Figure S2. The image of handheld pressure meter. A) The image of handheld pressure meter. B) The pressure reading process using gas-tight container and handheld pressure meter.

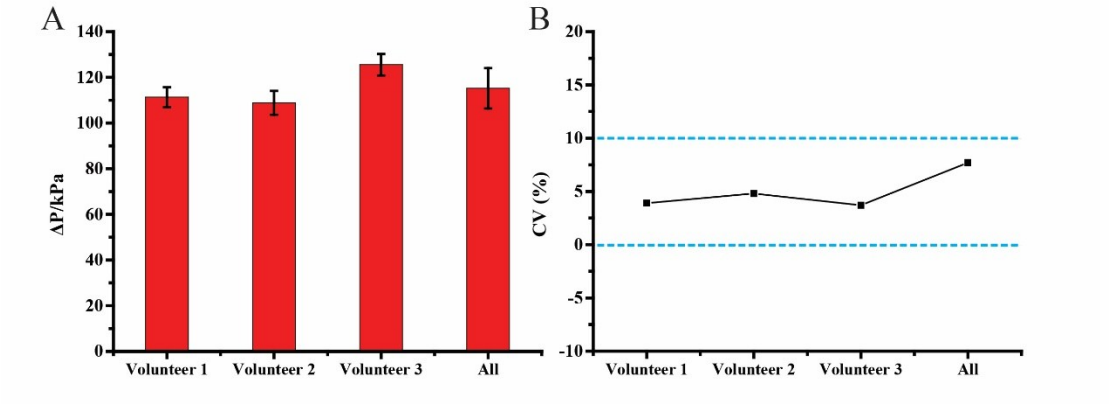

Figure S3. The test results of a same Myo sample operated by three volunteers. A) Pressure value of Myo detection operated by three volunteers. B) Intraexperiment CV% operated by different users.

Most enzymatic and chemical reactions are sensitive to temperature. Our system is also sensitive to temperature change. Catalytic reactions of PtNPs with 30% H_2O_2 at

different concentrations from 15℃ to 35℃ with the interval of 5℃ were performed. CVs (CV as coefficient of variation) of pressure values between 15℃ and 20℃, 20℃ and 25℃ were almost less than 10%. Based on the results, changes within 5℃ are acceptable at 15~25℃. CVs of pressure values between 25℃ and 30℃, 30℃ and 35℃ were mostly over 10%, especially in high PtNPs concentrations. Probably at higher temperatures, the temperature has a greater effect on the reaction. Therefore, the calibration curve is required at 25~35℃. However, it is better to make calibration curve under the same experimental condition for every test to remove temperature effect.

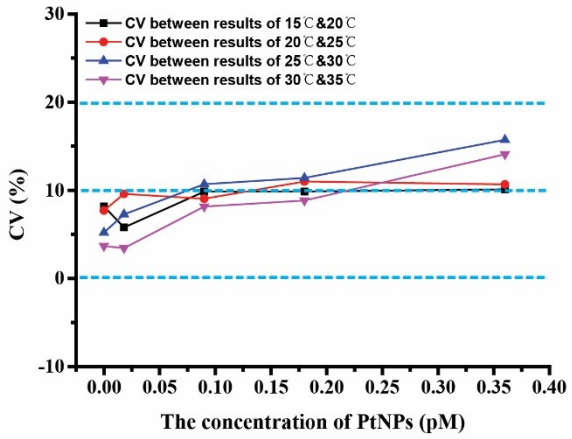

Figure S4. CVs of pressure change of different concentrations of PtNPs between different temperatures, tested in three parallel measurements.