

Supporting Document

Section1: Data acquisition and analysis on the smartphone.

Figure S1 shows the scheme of the smartphone-based colorimetric analysis. The square-shaped photograph is taken by a smartphone after TMB color development as shown in Fig. S1(a). The photo has to include the reaction chamber with TMB solution at the center of the photo. In controlling the background, the window is blacked out and the photo is taken under normal room lighting. Without controlling the background, the window is not blacked out and the photo is taken under mixed background conditions of natural light and under normal room lighting. The application (Color Helper) used for the analysis of the image is shown in Fig. S1(b). For the analysis of color development, the tone is analyzed by reading the intensity of red at the center of TMB (as signal) and outside of the reaction chamber (as background). These are measured as shown in Fig. S1(c, d). Thus, defining the tone intensity of TMB and outside as R_{TMB} and R_{OUT} , the analyzed result is defined to be $\text{Red Intensity} = R_{\text{TMB}}/R_{\text{DEV}} \times 100$.

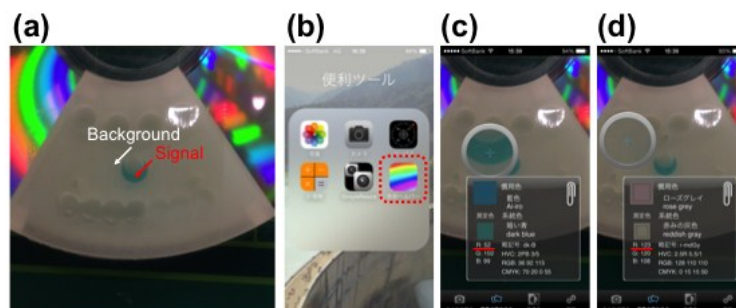


Fig. S1 The procedure of colorimetric analysis on a smartphone

Section2 Driving of the device on the mini-centrifuge

Figure S2 indicates the result of mini-centrifuge driven flow control. The detail of the experiment is same as the real-time observation experiment while the mini-centrifuge was used as device driver. From this series of observations, we conclude that flow behavior on the mini-centrifuge is consistent with the flow behavior observed in real-time. Therefore, the device is driven by the use of mini-centrifuge.

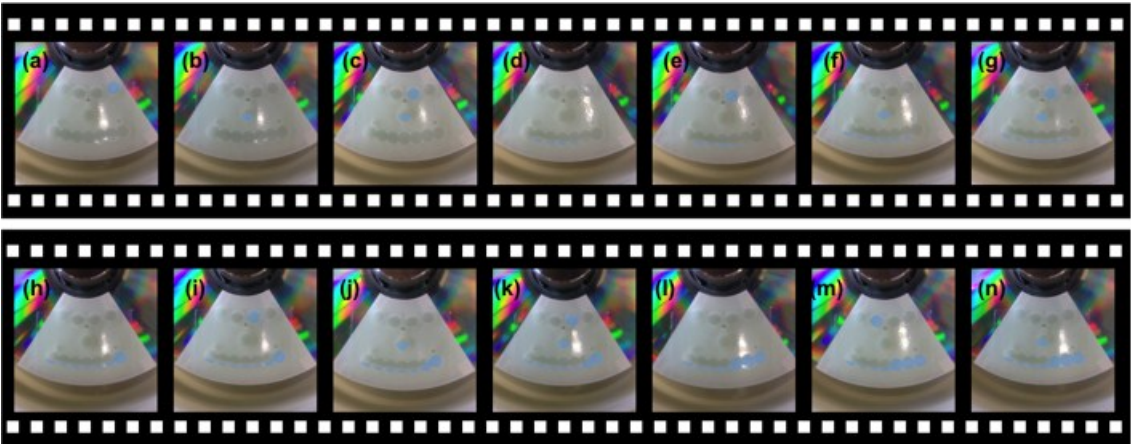


Fig. S2 The result of mini-centrifuge driven flow control. The position of the liquid is shaded in light blue for better visibility of the liquid position.

Section 3 Comparison of point-to-point assay with a multi-well assay

Errors of the calibration curves in Fig. 4 are relatively large compared to typical ELISA in our experience. We expect the errors arose due to the point-to-point measurement in preparing the calibration curve, as shown in Fig. 4. To compare the error with conventional multi-well measurements, we performed the measurement of human albumin in a PS titer plate with a conventional multi-well assay. The result is shown in Fig. S3. As shown in Fig. S3, the error bar of the calibration curve taken by the multi-well measurement is smaller than that of point-to-point measurement. Therefore, it is important to integrate multiple reactions on the centrifugal device to simultaneously perform multi-well assays in a single assay.

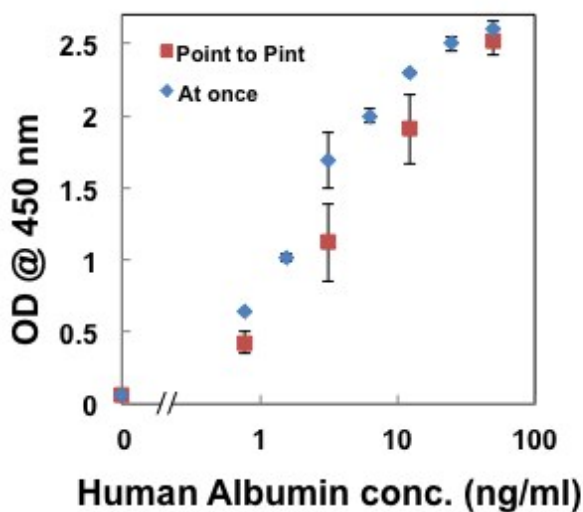


Figure S3 □ Calibration curves taken by multi-well measurement (simultaneous) and point-to-point measurement