Electronic Supplementary Material (ESI) for Analyst.

Supplementary information

Erythrocytes-based quartz crystal microbalance cytosensor for in situ detection of cell surface sialic acid

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Table S1 Infrared absorption spectrum of samples.

Sample	B-O	C=O	C-N	Ar-H	N-H
APBA	1357	---	---	900、609	3477、3392
AuNPs/APBA	1330	1635	1568	885、669	3426

Table S2 Measured parameters of erythrocytes membrane of normal and diabetes by atomic force microscopy.

Type of cell	Particle analysis (nm)	R_q (nm)	R_a (nm)
(A) Normal RBCs	37.52±11.11	2.60±0.56	2.07±0.32
(B) Diabetes RBCs	11.17±7.23	1.82±0.91	1.51±0.63
(C) Normal RBCs treated with AuNPs/APBA	97.27±9.01	5.84±1.21	4.05±0.81
(D) Diabetes RBCs treated with AuNPs/APBA	62.54±15.81	3.74±0.71	2.58±0.32

Fig. S1

Quantitative detection of SA expression on diabetes RBCs surface by proposed cytosensor, as shown in Fig.S1. The QCM frequency response exhibited a linear response toward the captured RBCs from 7.1×10^3 to 1.2×10^4 . The regression equation is

$$-\Delta f = 0.039\ N - 41.28 \qquad R^2 = 0.9811 \qquad \ldots\ldots\ldots\ldots\ldots\ldots (1')$$

Furthermore, Fig. S1B displayed linear relationship between reduction value of QCM frequency response (ΔF) and free SA concentration on AuNPs/APBA nanoprobe. The regression equation is

$$\Delta F = 286.2\ C_{SA} + 789.91 \qquad R^2 = 0.9971 \qquad \ldots\ldots\ldots\ldots\ldots\ldots (2')$$

The average number of SA per captured diabetes RBC was calculated to be $(8.2 \pm 0.7) \times 10^7$ using Eqs. (1') and (2').

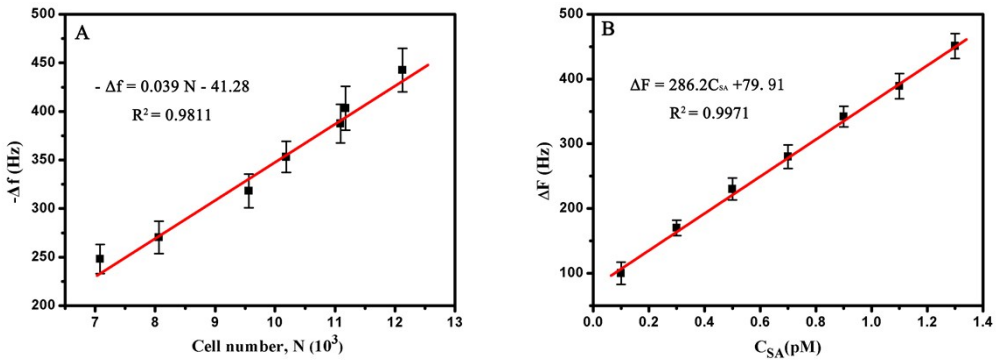

Fig. S1 Quantitative detection of SA expression on diabetes RBCs

(A) The linear relationship of Δf signal vs numbers of captured diabetes RBCs (N) on the cytosensor. (B) Effect of the free SA concentration (C_{SA}) on the decrease of frequency response.