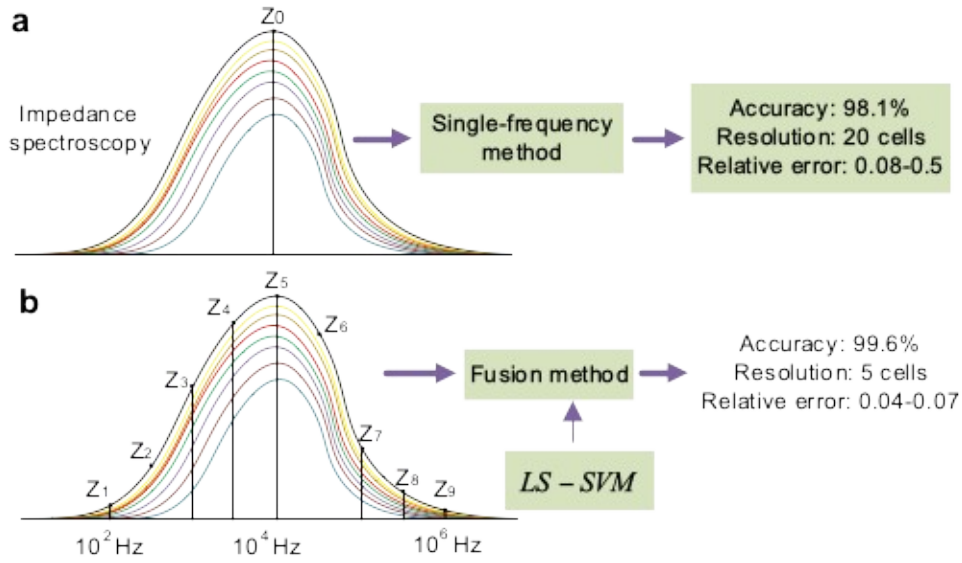
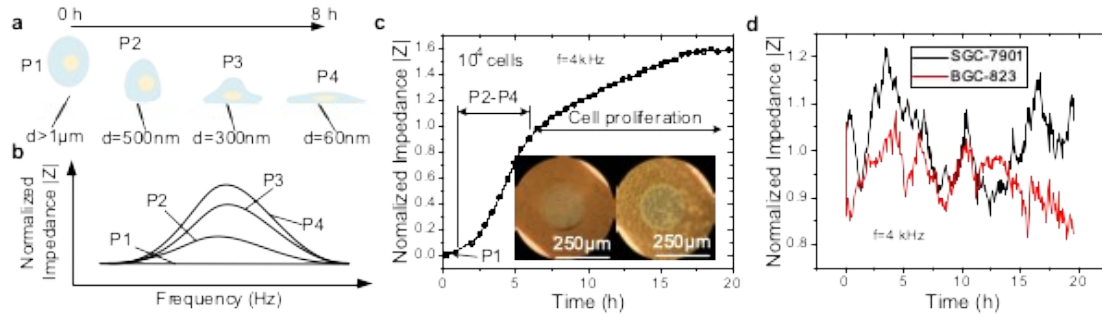


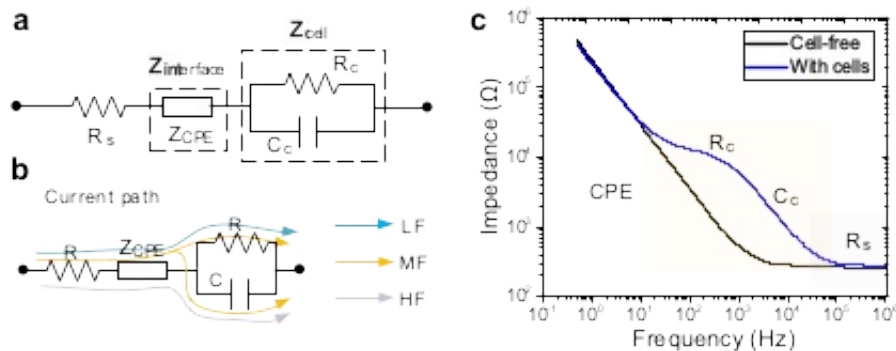
## FIGURES AND LEGENDS



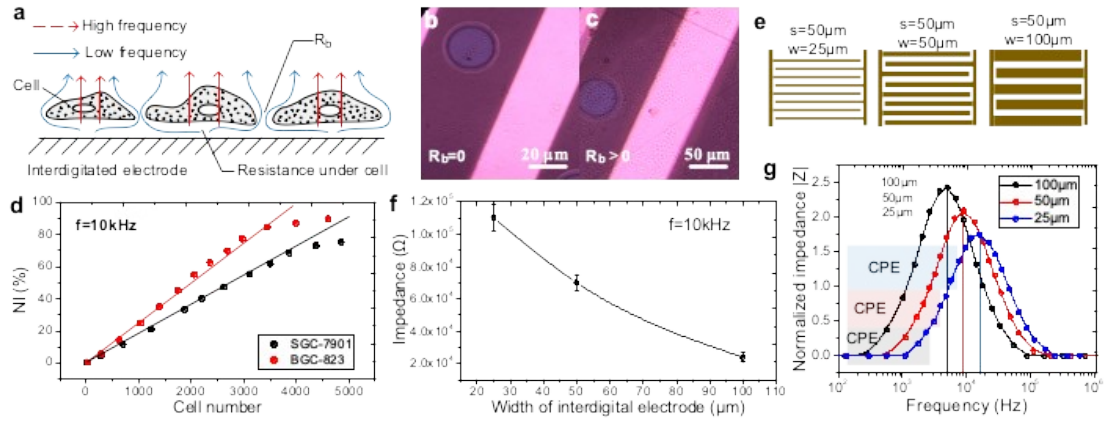
**FIGURE 1** Comparison diagram of the fusion method and single-frequency method. (a) Single-frequency method utilizes an impedance at a constant frequency or the most sensitive frequency for cell viability evaluation. The accuracy of single-frequency method is about 98.1%, the distinguishing resolution is about 20 cells and the range of relative errors is from 0.08 to 0.5. (b) Fusion method based on LS-SVM utilizes multi-frequency impedances for cell viability evaluation. The accuracy of fusion method is about 99.6%, the distinguishing resolution is about 5 cells and the range of relative errors is from 0.04 to 0.07.



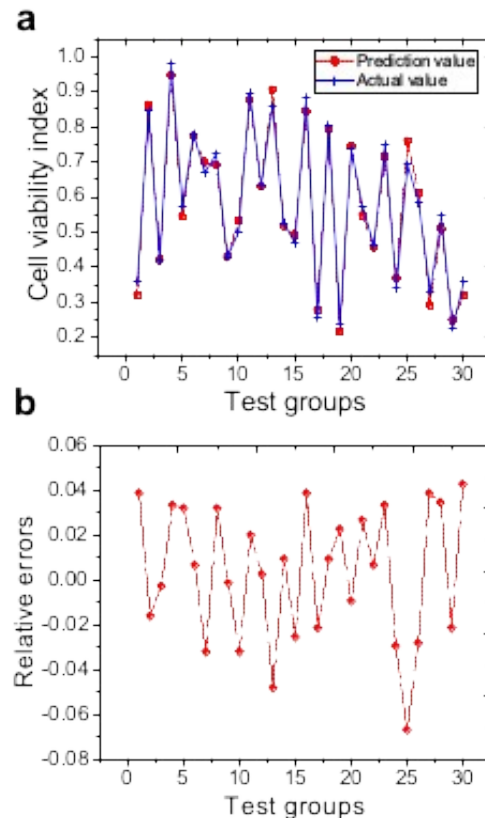
**FIGURE 2** Monitoring of cell dynamic events. (a) The process of cell adhesion with course of time. P1 to P4 represent cell seeding, initial adhesion, cell adhesion and cell spreading, respectively. (b) Diagram of normalized impedance spectroscopy with different cell adhesion statuses. (c) Normalized impedance of cell dynamic events from cell seeding to cell proliferation. (d) Normalized impedance of cell movement at 4 kHz.



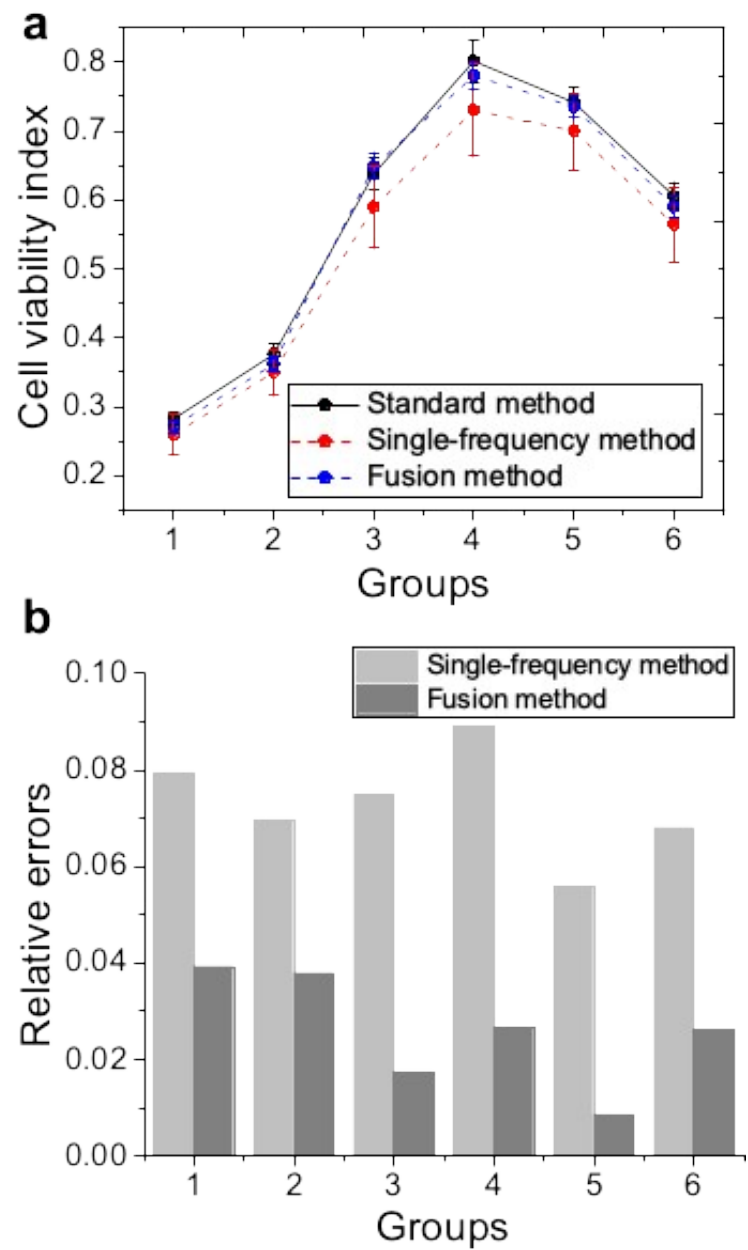
**FIGURE 3** Theoretical model of cell adhesion. (a) The equivalent circuit model of cell adhesion on electrodes. (b) The diagram of main current paths in different frequency bands. (c) The contribution area of elements to CIS. CPE dominates to the CIS in LF band, cell impedances ( $R_c$ ,  $C_c$ ) dominate to CIS in LF and MF bands, while  $R_s$  mainly dominates to CIS in HF band.



**FIGURE 4** The influencing factors on overall impedance. (a) Diagram of the adhesion cells emphasizing the spaces between the cell and the substratum. (b) Cells adhered on interdigitated electrodes with low density ( $R_b = 0$ ). (c) Cells adhered on interdigitated electrodes with high density ( $R_b > 0$ ). (d) The relationship between cell number and normalized impedance (NI) at 10 kHz. (e) Diagram of interdigital electrode with different widths ( $w = 25, 50, 100 \mu\text{m}$ ) and same spacing ( $s = 50 \mu\text{m}$ ). (f) The impedance of interdigital electrode with different widths measured at 10 kHz. (g) The contributions of different CPEs (caused by different electrode sizes) to the most sensitive frequency.



**FIGURE 5** Results of cell viability evaluation based on LS-SVM. (a) The training results compared with actual values. (b) The relative errors between prediction value and actual value.



**FIGURE 6** (a) Comparison analysis among the standard method, single-frequency method and fusion method. (b) The relative errors of two methods compared with standard method.