

Fig. 1. Microparticle manipulation in liquid using (a) rectangular and (b) square Si_3N_4 diaphragm resonators. Optical microscopic images show 1D and 2D *inverse* Chladni patterns when silica microbeads ($3.62\mu\text{m}$ -diameter) are dispersed onto resonating devices. These patterns agree with the simulated mode shapes (red and blue colored regions represent antinodes and nodes, respectively). Florescent microscopic images show breast cancer cells ($15\mu\text{m}$ -diameter) are manipulated in both 1D and 2D fashions.

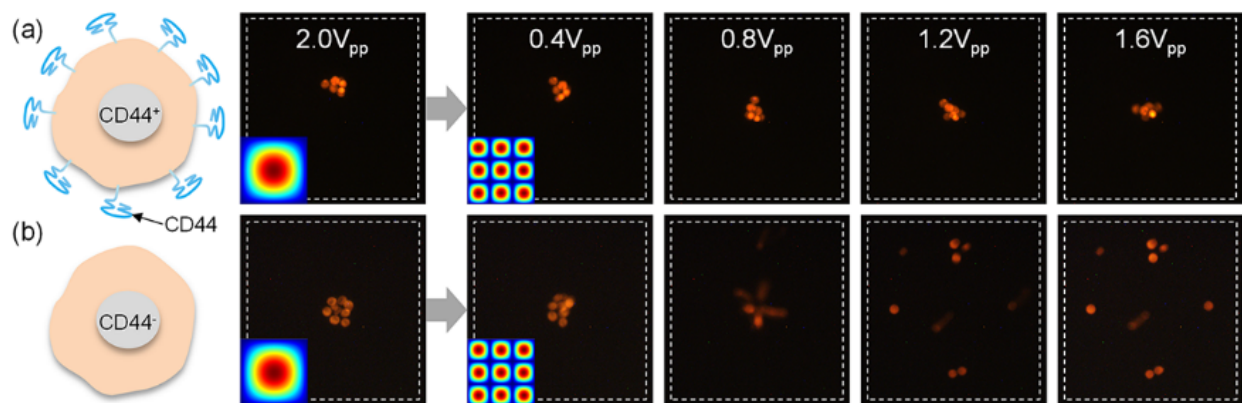


Fig. 2 (a) A group of CD44^+ MDA-MB-231 cells are aggregated into 1 cluster when Mode (1,1) is 'ON'. The cluster remains as Mode (3,3) is switched and the excitation voltages increases from 0.4 to 1.6V_{pp} . (b) A group of CD44^- MDA-MB-231 cells are clustered when Mode (1,1) is 'ON'. The cluster then breaks into several parts when Mode (3,3) is 'ON' and excitation amplitude increases to $\sim 0.8\text{V}_{\text{pp}}$. This suggest that CD44^+ cells form stronger adhesive interactions than CD44^- cells do. Therefore, CD44 plays an important role in metastatic breast cancer cell clustering.