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Electronic Supplementary Information

Single mammalian cell encapsulation by *in situ* polymerization

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Materials. HeLa cells were purchased from Cascade Biologics (JCRB cell bank, Tokyo, Japan), hMSCs were purchased from Lonza (Walkersville MD, USA), and BACs were isolated from the articular cartilage derived from a 9-week old female calf. Eagle's Minimum Essential Medium (EMEM), Dulbecco's modified Eagle's medium (DMEM), L-glutamine, penicillin, streptomycin, trypsin/EDTA, *N*-acryloxysuccinimide (NAS), acrylamide (AAm), glycerol dimethacrylate (GDMA), *N,N,N′,N′*-tetramethylethylenediamine (TMEDA), branched polyethylenimine (PEI) (Mw = 25 kDa by LS), and 0.4% trypan blue were purchased from Sigma-Aldrich (St Louis, MO, USA). Fetal bovine serum (FBS) was purchased from Gibco Laboratories (Grand Island, NY, USA). Dimethyl sulfoxide (DMSO), chloroform-d ($CDCl_3$), ammonium persulphate (APS), 25% glutaraldehyde solution, hydrogen tetrachloroaurate tetrahydrate (HAuCl4·4H2O), (3-aminopropyl)triethoxysilane (APTES), and trisodium citrate dehydrate were obtained from Wako Pure Chemical (Osaka, Japan). WST-1 reagent was obtained from Roche Molecular Biochemicals (Mannheim, Germany). Cellmask™ Deep Red plasma membrane stain, human CD44s pan specific antibody monoclonal mouse IgG_{2A} clone (primary antibodies), and Alexa Fluor@488 goat anti-mouse IgG(H+L) (secondary antibodies) were purchased from Life technologies (USA). Cellstain live/dead double staining kit and 4′-6-diamidino-2-phenylindole (DAPI) solution were purchased from Dojindo Laboratories (Kumamoto, Japan). FITC-PEG-SH (Mw = 5 kDa) and mPEG-SH (Mw = 5 kDa) were obtained from Nanocs, Inc. (Boston, USA). All the chemical reagents were used as received without further purification. Water used in all the experiments was ultrapure water with a resistivity of 18.2 MΩ cm purified by a Q-POD Milli-Q water purification system (Millipore Corp., USA).

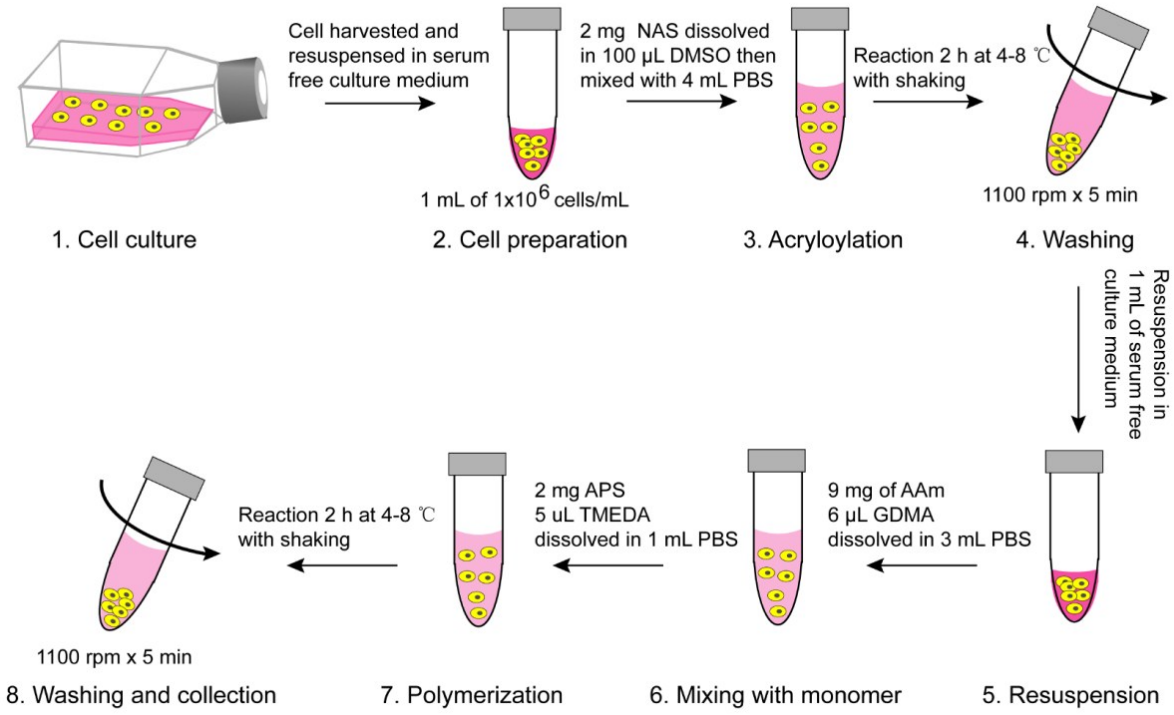

Figure S1. Schematics of experimental procedures for single mammalian cell encapsulation.

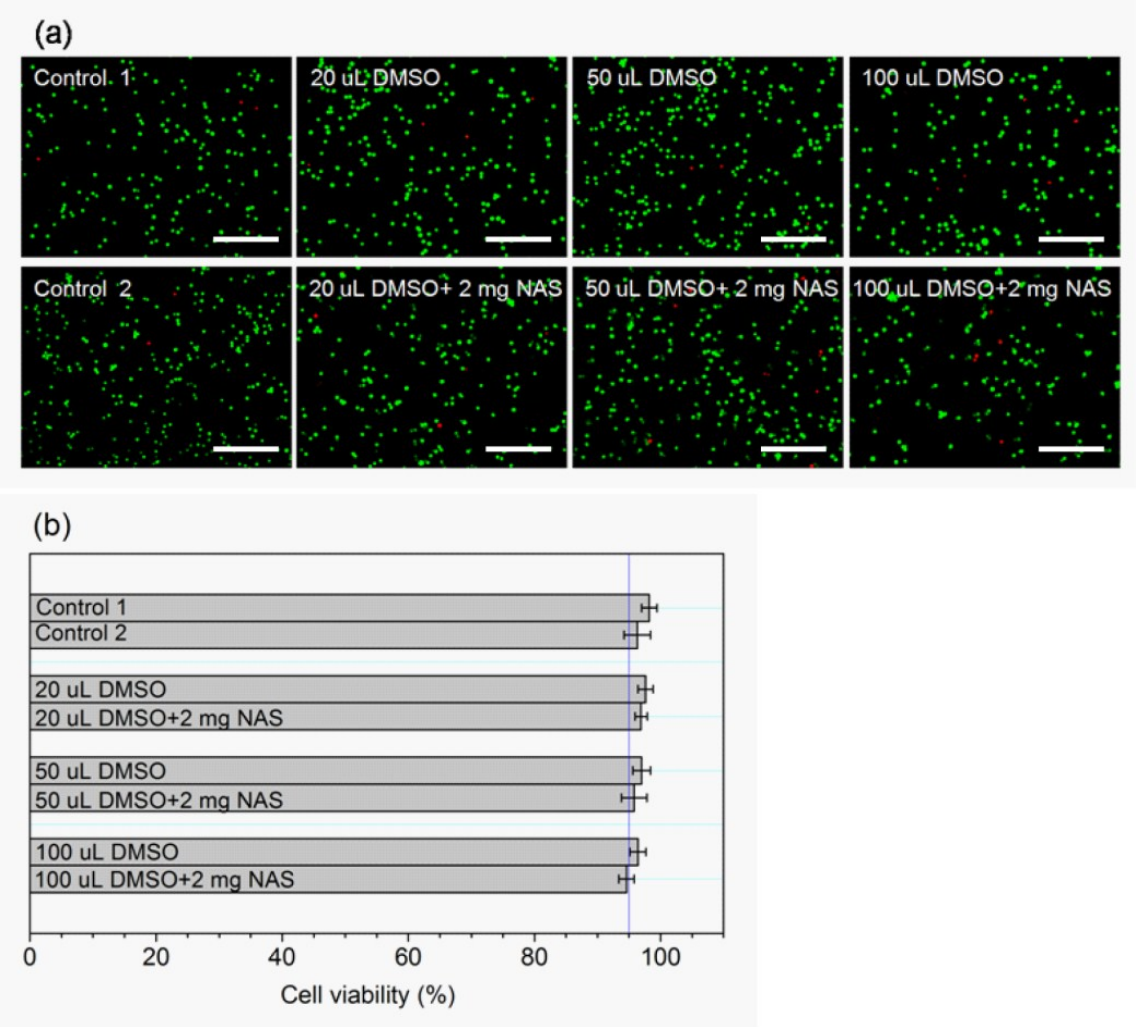

Figure S2. Viability of HeLa cells in surface acryloylation step with various volume of DMSO. (a) Representative images of HeLa cells with live/dead staining, cells in green were considered alive, and the ones in red were considered dead. The scale bar in all the images is 200 μm. (b) The cell viability of HeLa cells in each condition measured by WST-1 assay. The total reaction medium was 5 mL, control 1 means the reaction medium was 5 mL of culture medium, and the reaction medium for control 2 and other samples were 1 mL of culture medium mixing with 4 mL of PBS. All groups have no significant difference after statistical analysis.

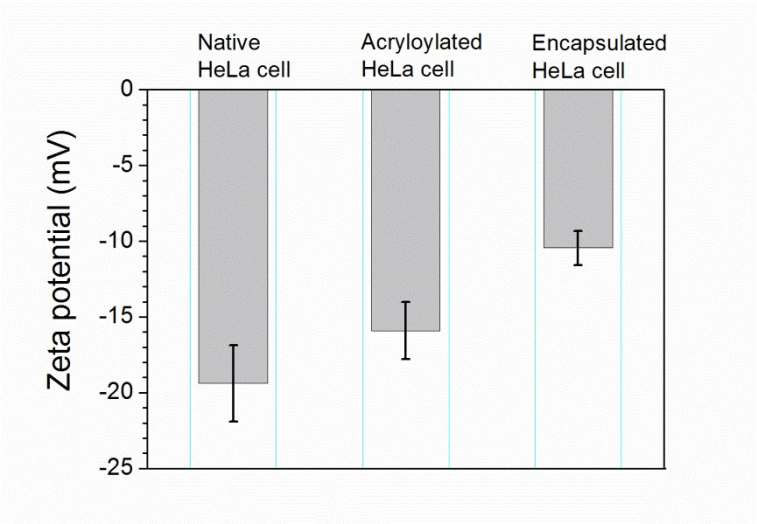

Figure S3. Zeta potential of native HeLa cells, acryloylated HeLa cells and encapsulated HeLa cells.

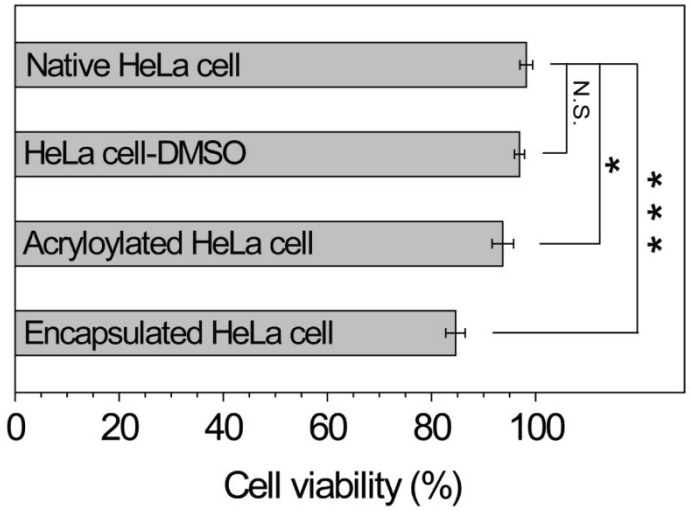

Figure S4. Cell viability of HeLa cells by live/dead staining. N.S., not significant; *$p < 0.05$; ***$p < 0.001$.

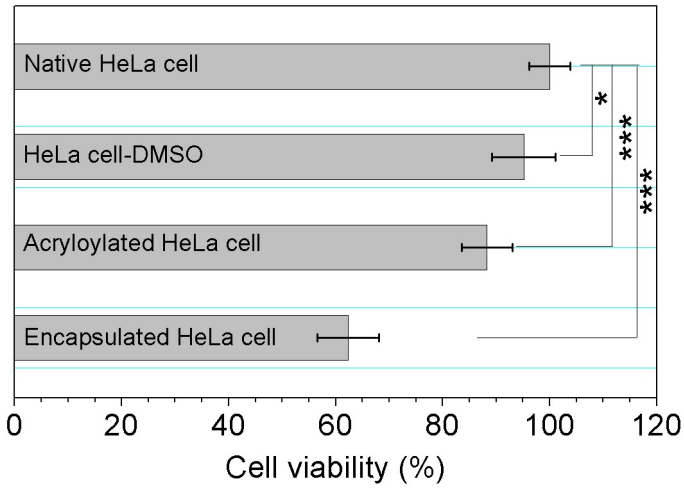

Figure S5. Cell viability of HeLa cells after 8 h of culture. The optical density value of native HeLa cells denote as activity of 100 %. *$p < 0.05$; ***$p < 0.001$.

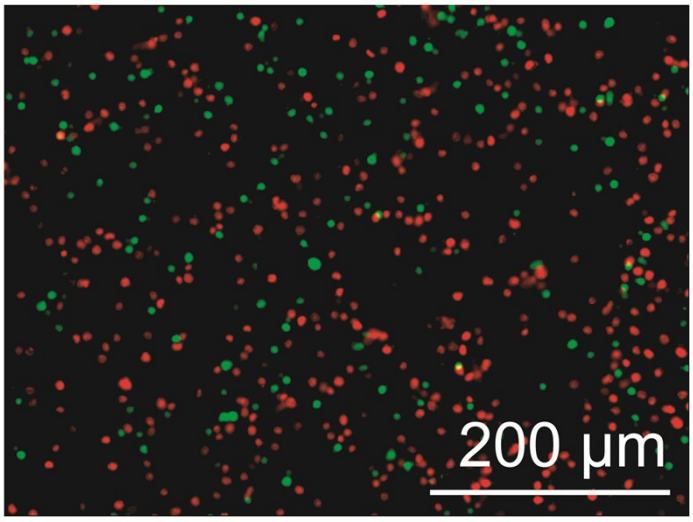

Figure S6. Live/dead staining of encapsulated HeLa cells after 3 days cultivation. Cells in green were considered alive, and cell in red were considered dead.

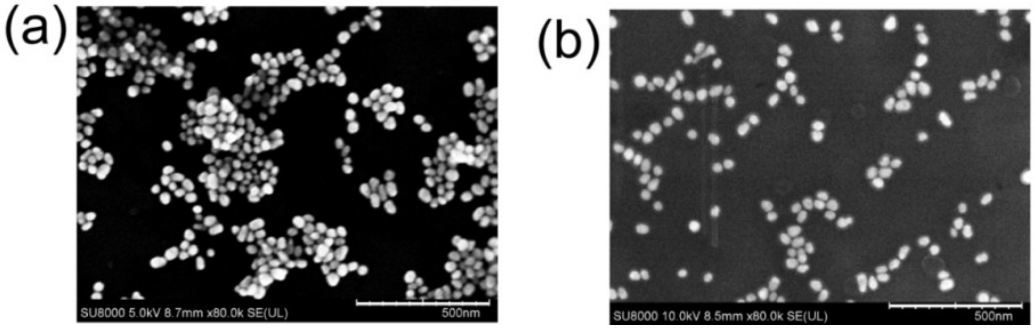

Figure S7. FE-SEM micrographs of (a) AuNPs and (b) FITC-PEG-AuNPs. The scale bar is 500 nm.

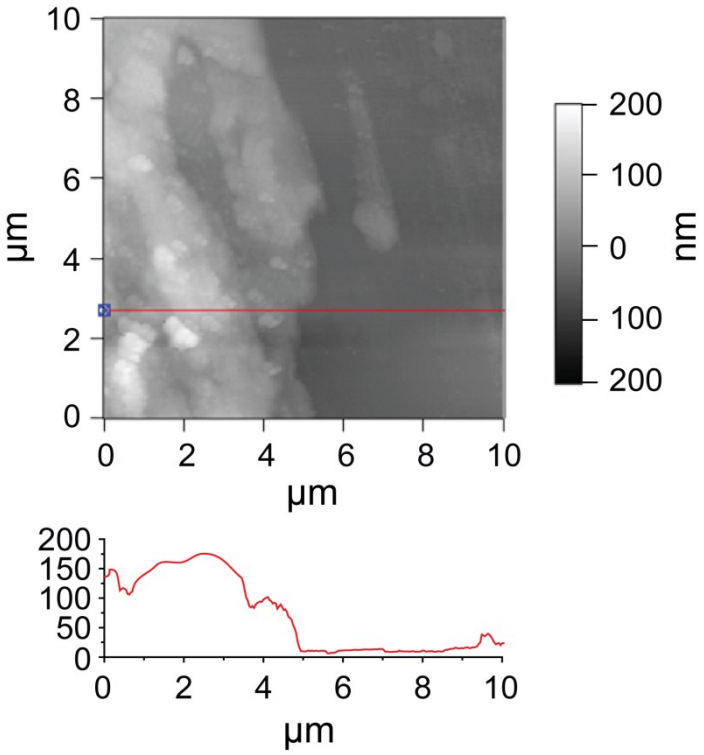

Figure S8. Height images (up) and section view (down) of a silicon wafer surface with grafted polymer encapsulation shell on the left half and bare surface on the right half. The images were scanned by AFM.