**Supporting Information**

# Size-controlled Preparation of Micro-sized Perfluorocarbon Emulsions as Oxygen Carriers via SPG Membrane Emulsification Technique

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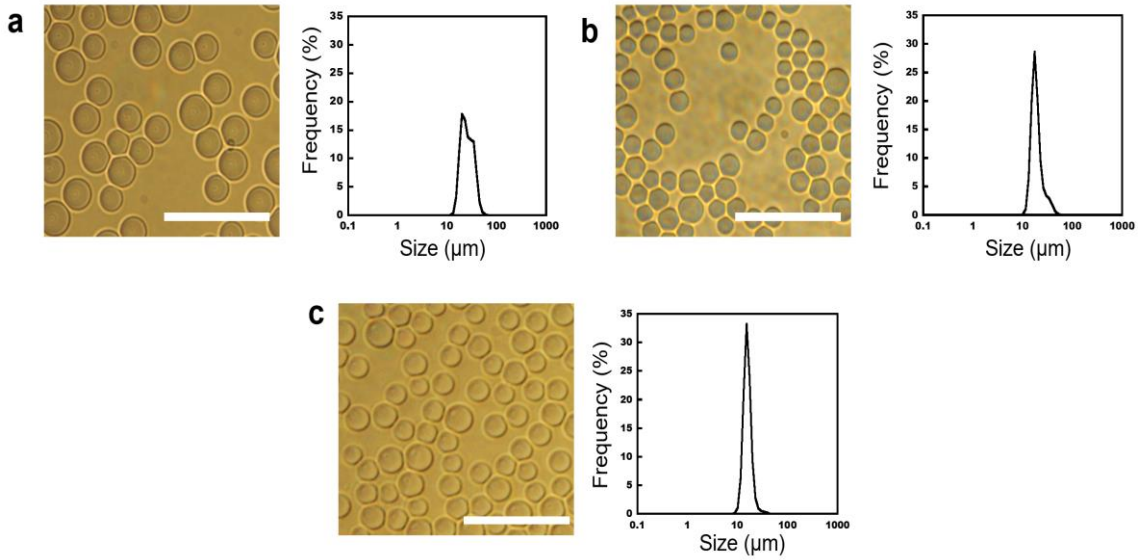


**Figure S1.** Optical pictures and size distributions of FDC emulsions prepared via SPG membrane with pore size of (a) 5 μm (b) 4 μm (c) 3 μm. Scale bars: 50 μm

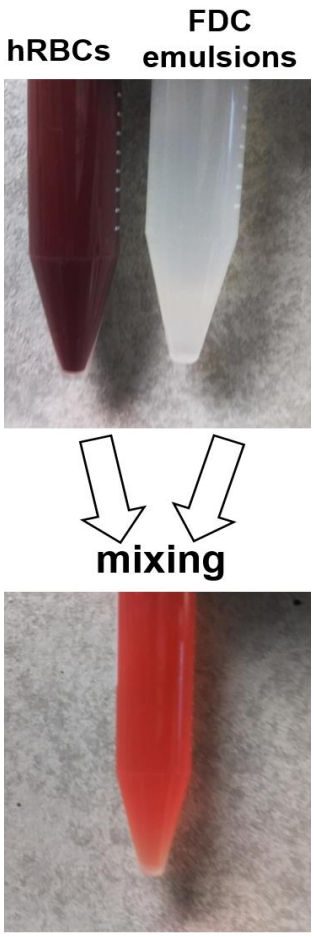


**Figure S2.** Mixing FDC emulsions with hRBCs

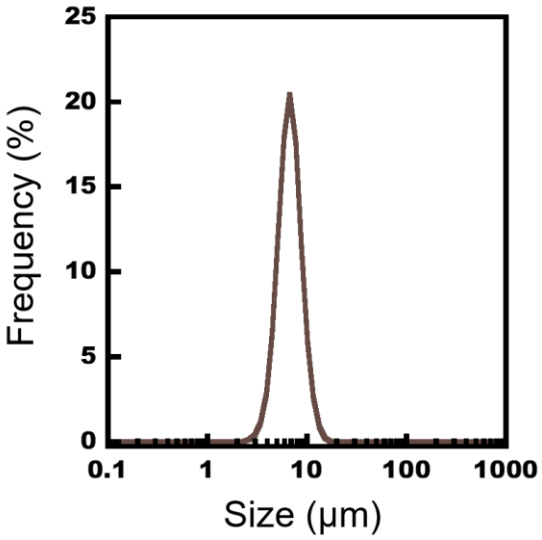


**Figure S3.** Size distribution of hRBCs measured using laser diffraction.

**Table S1** Statistical analysis for different Pluronics at certain concentration

| Subject | *P* (0.2%) | *P* (2%) |
|---|---|---|
| F127/P103 | 0.0003 | 0.1 |
| F68/P85 | 0.0002 | 0.7 |
| F127/F68 | 0.2 | <0.0001 |
| F127/P85 | <0.0001 | <0.0001 |
| F68/P103 | 0.0002 | <0.0001 |
| P85/P103 | 0.1 | <0.0001 |

**Table S2** Statistical analysis for certain Pluronics between different concentrations

| Pluronics | *P* |
|---|---|
| F127 | <0.0001 |
| F68 | <0.0001 |
| P85 | 0.002 |
| P103 | <0.0001 |

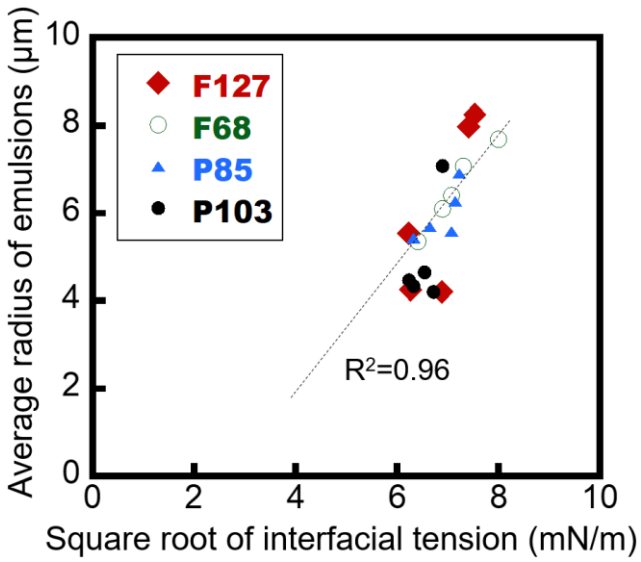


**Figure S4.** Relationship between the radius of emulsions and square root of the interfacial tension.

**Table S3** Critical pressures used to produce FDC emulsions with different Pluronics and their concentrations (kPa).

| Pluronic | Concentration of Pluronic in saline | | | | |
|---|---|---|---|---|---|
| | 0.2% | 0.5% | 1% | 2% | 3% |
| F127 | 50 | 50 | 49 | 39 | 37 |
| F68 | 51 | 50 | 50 | 46 | 48 |
| P85 | 29 | 24 | 25 | 21 | 17 |
| P103 | 20 | 24 | 21 | 24 | 18 |

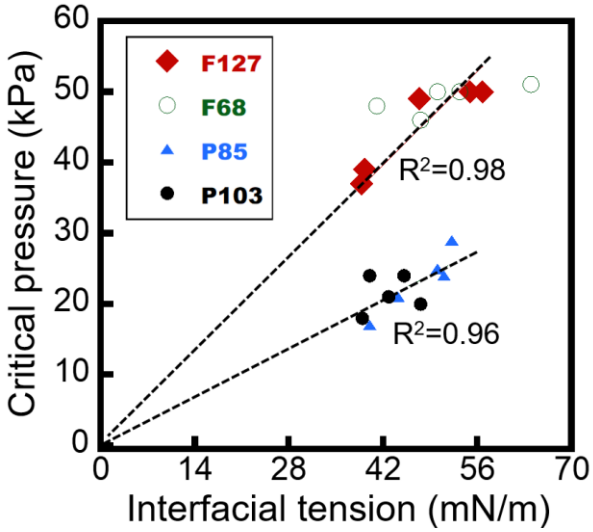


**Figure S5.** Relationship between the critical pressures and interfacial tensions. Dotted lines show the fitting lines based on eq 3 in the main text. Based on the catalogue-reported value of the membrane pore size, $R_p$ = 1.0 μm, $\theta$ was estimated to be 63° for F127-F68 and 75° for P85-P103.

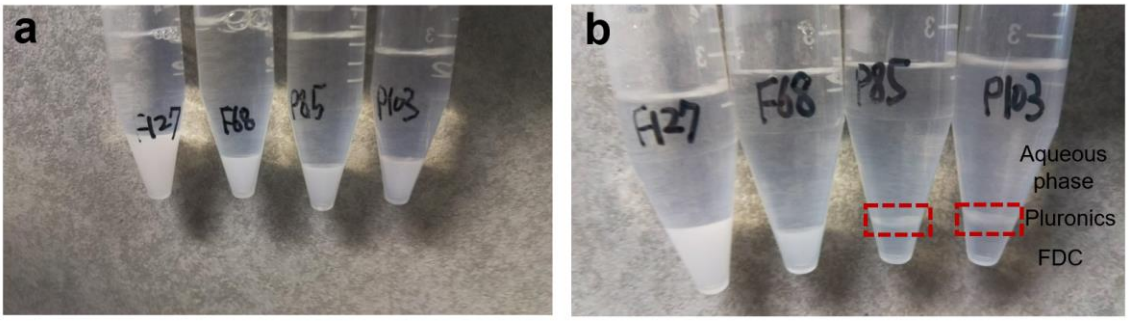


**Figure S6.** Pictures of emulsions with different Pluronics after preserving at (a) room temperature and (b) 4℃. Dashed rectangles indicate the phase-separated Pluronics phase.

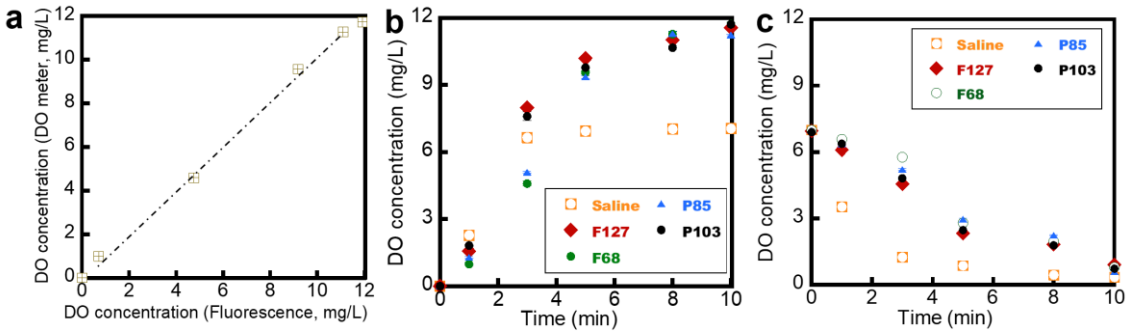


**Figure S7**. Oxygen loading and release curves measured via DO meter. (a) Correlation between oxygen concentrations measured by fluorescence from Ru(ddp)-loaded FDC emulsions and DO meter. (b) Oxygen loading: mediums were first deoxygenated by nitrogen and then oxygenated by air. (c) Oxygen release: mediums were first oxygenated by air and then deoxygenated by nitrogen. All the data were shown as average ± standard deviation (N=3).

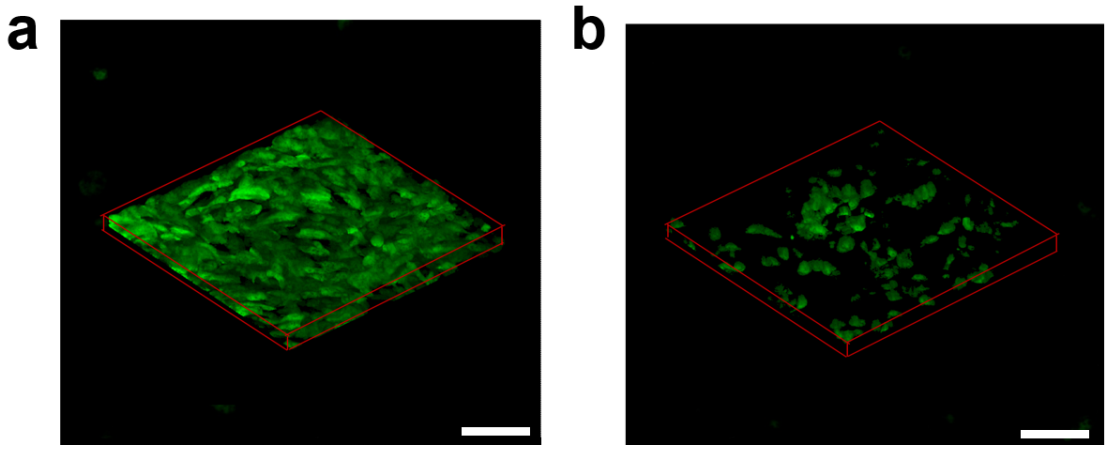


**Figure S8.** 3D-constructed confocal microscopic images of multilayer EGFP cells cultured (a) without and (b) with FDC emulsions under 2% $O_2$. Scale bars: 50 μm