# Supporting Information

## Synthetic Glycopolymers for Highly Efficient Differentiation of Embryonic Stem Cells into Neurons: Lipo- or not?

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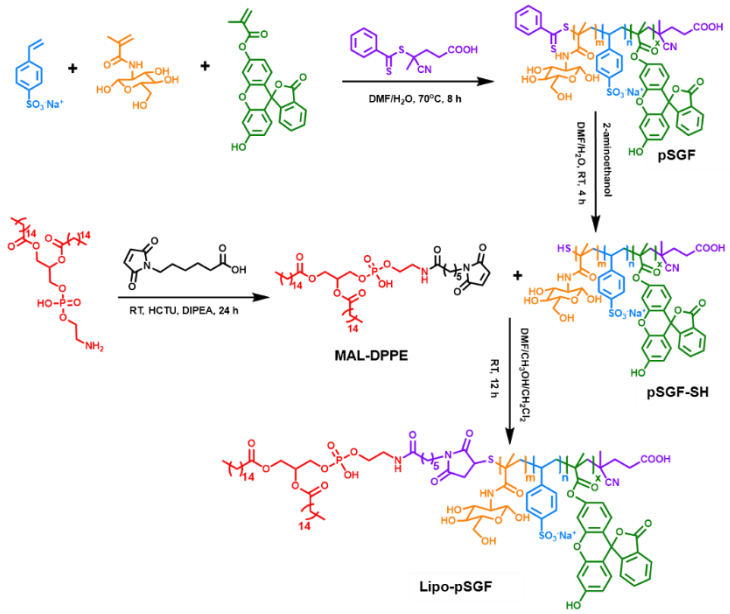


**Figure S1.** Synthesis of lipo-pSGF via the strategy of post-polymerization modification.

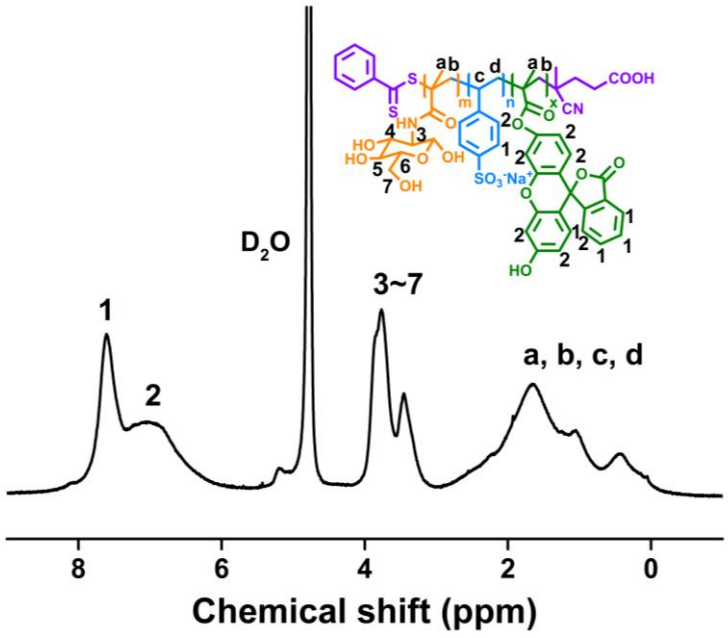


**Figure S2.** The $^{1}H$ NMR spectrum of pSGF in $D_2O$.

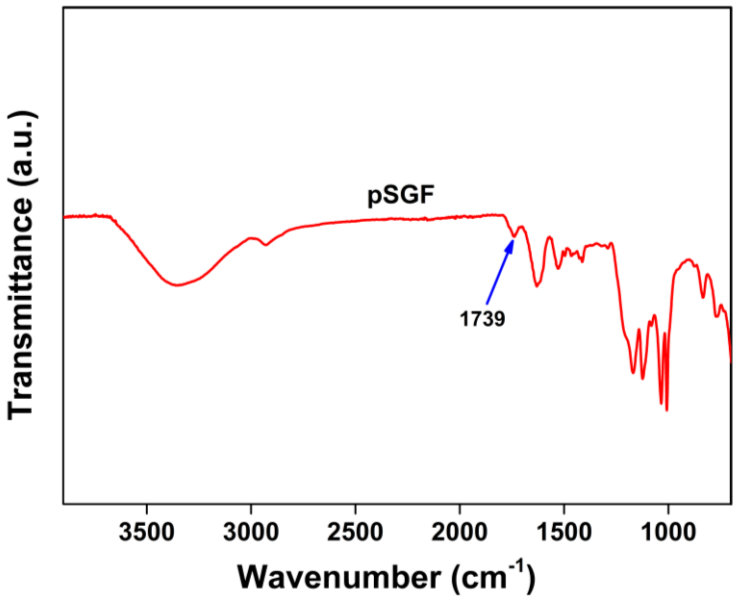


**Figure S3.** The FT-IR spectrum of pSGF. The emergence of the peak of carbonyl (1739 $cm^{-1}$) in ester groups demonstrated a successful copolymerization of FluMA with MAG and SS.

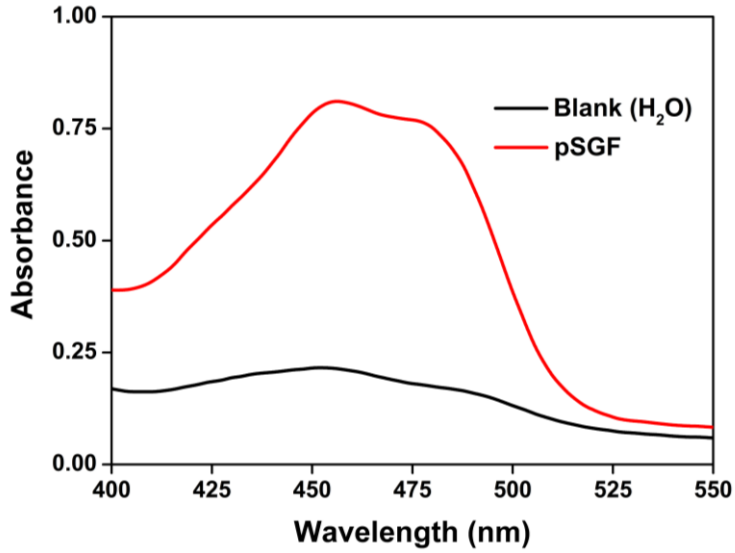


**Figure S4.** UV-Vis spectra of PSGF over a wavelength range of 400-550 nm. The maximum absorption of pSGF is at 448-478 nm.

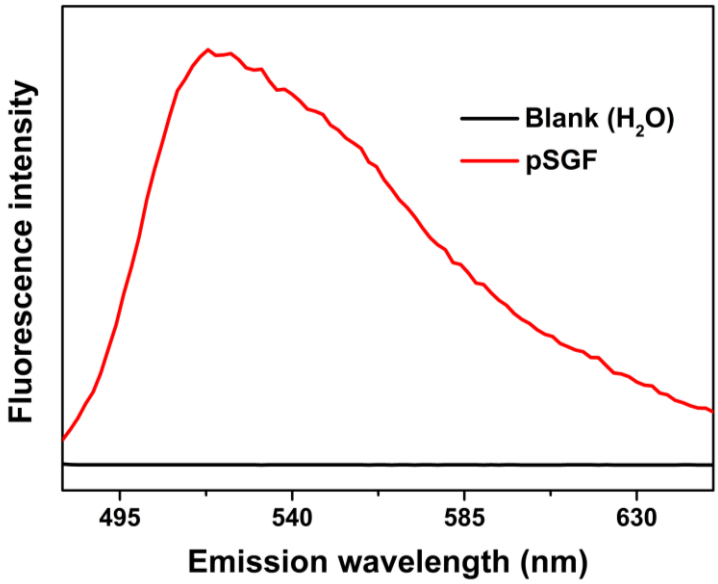


**Figure S5.** Fluorescence spectra of pSGF excited at 460 nm. pSGF showed the high level of fluorescence intensity.

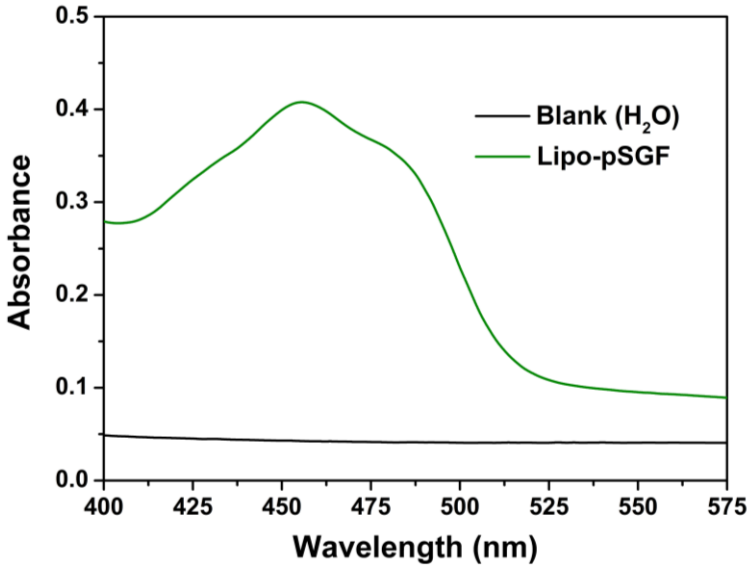


**Figure S6.** UV-Vis spectrum of lipo-PSGF over a wavelength range of 400-575 nm. The maximum absorption of lipo-pSGF is at 456 nm.

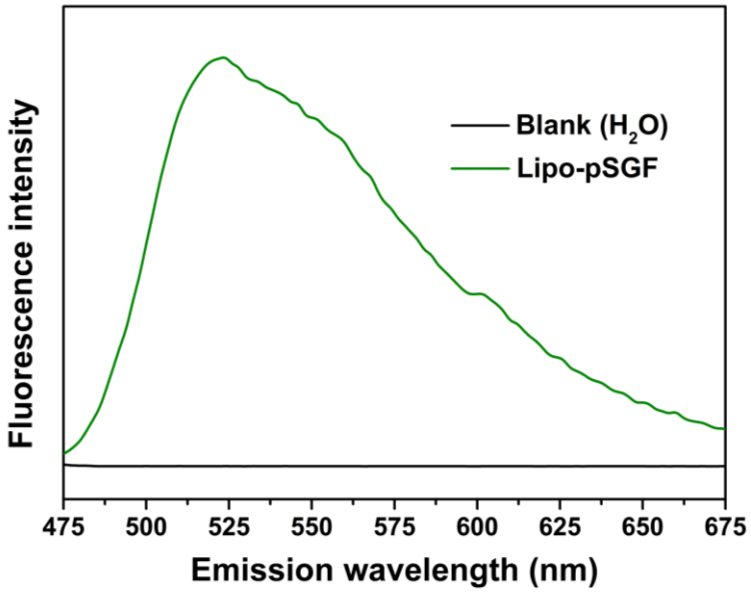


**Figure S7.** Fluorescence spectrum of lipo-pSGF excited at 456 nm, with the maximum emission at 524 nm.

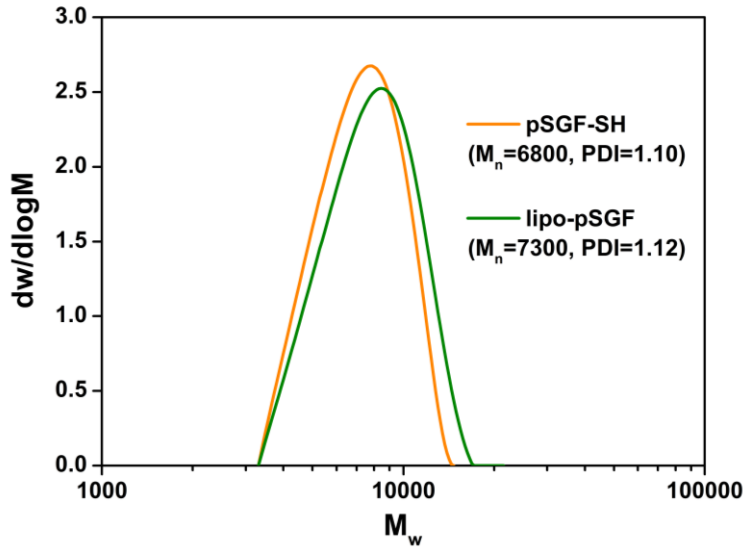


**Figure S8.** GPC traces of pSGF-SH and lipo-pSGF.

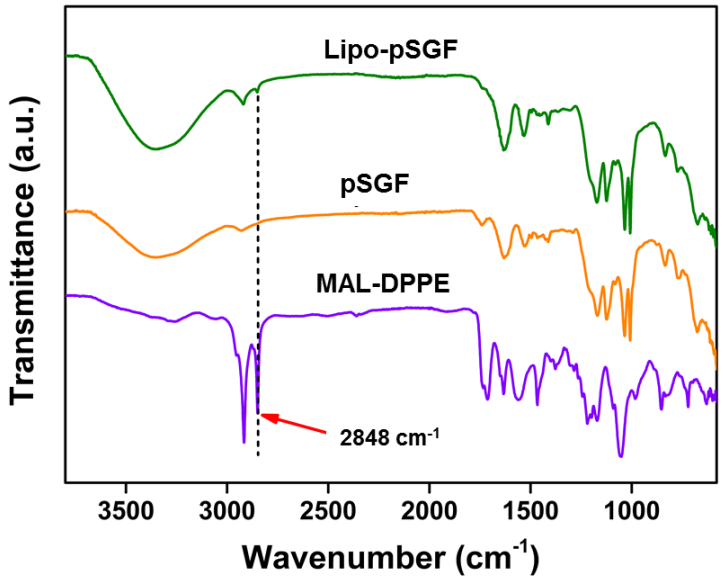


**Figure S9.** IR spectra of the respective compounds.

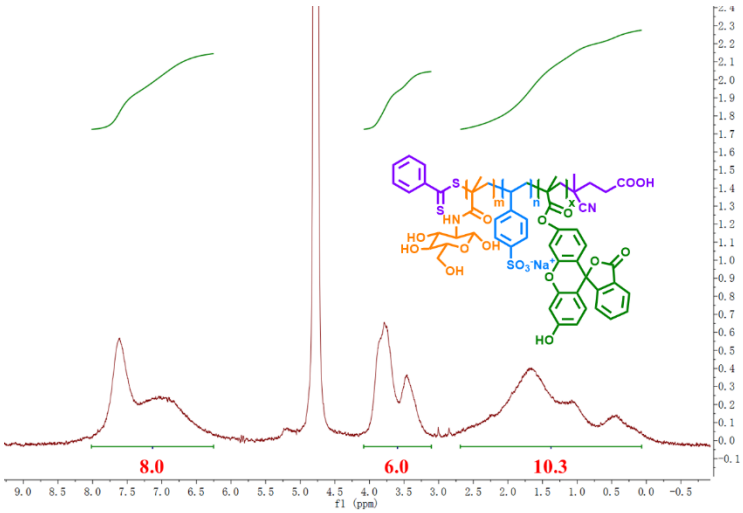


**Figure S10.** The NMR integration of pSGF.

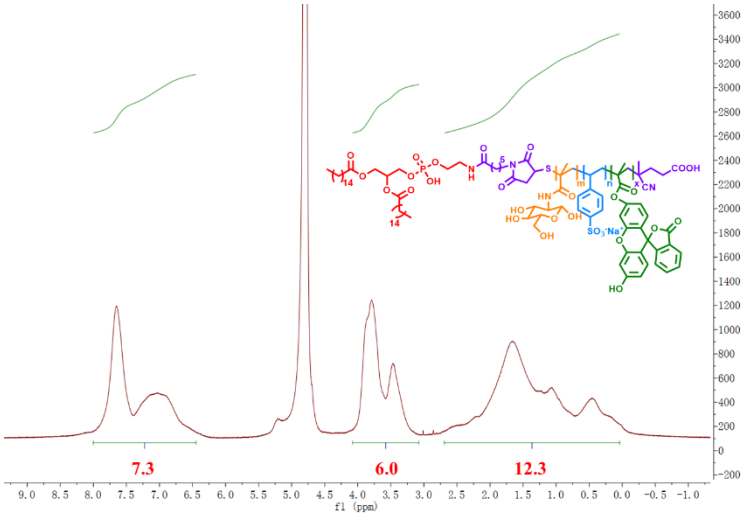


**Figure S11.** The NMR integration of lipo-pSGF.

**Table S1.** Molecular weight and composition of lipo-pSGF.

| Sample | Feed ratio (SS: MAG: FluMA) | Ratio of $^1$H-NMR (SS: MAG: FluMA: DPPE)* | $M_n$ (GPC) | PDI |
|---|---|---|---|---|
| Lipo-pSGF | 1:1:0.04 | 1.3:1:0.28:0.03 | 7300 | 1.12 |

* The ratio of SS, MAG and FluMA can be calculated from Figure S10, and the content of DPPE groups can be calculated by comparison of the integration of protons from methyl and methylene groups in both Figure S10 & S11.

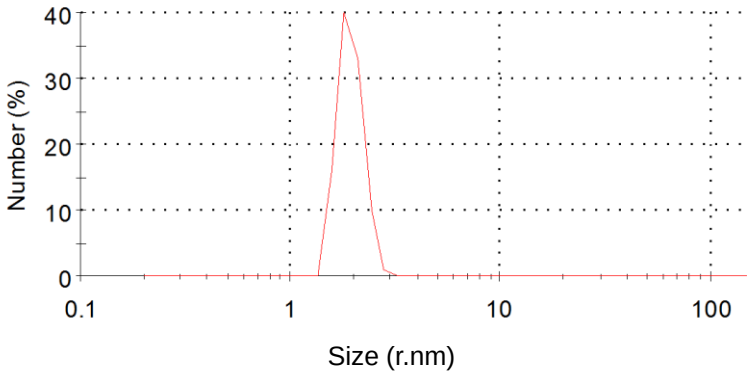


**Figure S12.** Dynamic light scattering plot of lipo-pSGF at 37°C in water.

**Table S2**. q-PCR primers used in the study.

| Gene | Forward Primer | Reverse Primer | Amplicon (bp) |
|---|---|---|---|
| β-actin | CCCTAGGCACCAGGGTGTGA | TCCCAGTTGGTAACAATGCCA | 128 |
| OCT4 | GGCGTTCTCTTTGGAAAGGT | TCTCATTGTTGTCGGCTTCCT | 112 |
| β3-tubulin | ACTTTATCTTCGGTCAGAGTG | CTCACGACATCCAGGACTGA | 96 |

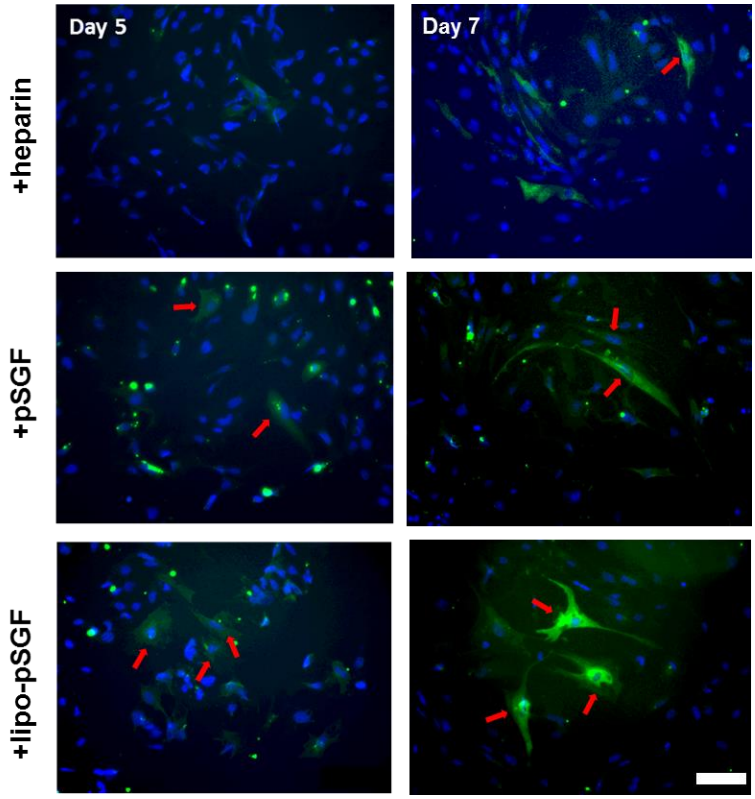


**Figure S13.** Immunofluorescence images of mESCs (green: β3-tubulin; blue: DAPI) treated with the synthetic copolymers and heparin for 5 and 7 days. More neural cells were observed in the lipo-pSGF-treated group at day 5 and 7. And the similar cell phenotypes with the axonal cell body were indicated by red arrows.

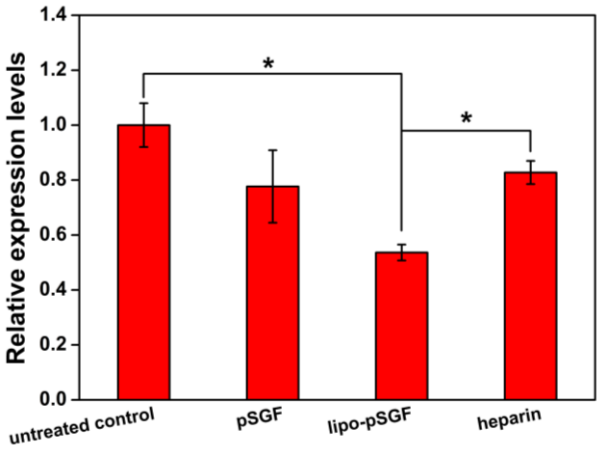


**Figure S14.** Pluripotent gene OCT4 expressions of differentiated cells evaluated quantitatively by qRT-PCR analysis at day 7. Error bars represent the standard deviation of the mean (n = 3, *P < 0.05 by t-test).

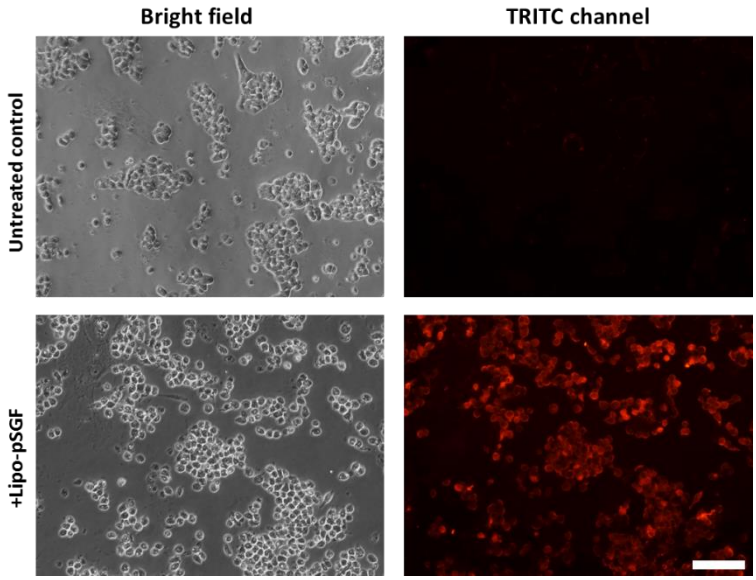


**Figure S15.** Fluorescence microscopy images of mESCs incubated with FGF2 for 1 h. As indicated in red, lipid-anchored membrane-remodeled mESCs can bind FGF2 effectively. Scale bars: 100 μm.

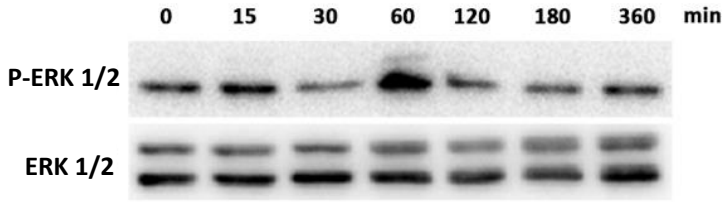


**Figure S16.** Western blotting of mESCs stimulated with 10 ng/mL FGF2 for different time. At the time point of 60 min, the phosphorylation of ERK1/2 showed the highest levels in mESCs stimulated with FGF2.