

Supplementary Material

Diglycidyl esters cross-linked low molecular weight polyethyleneimine for magnetofection

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1. ¹H NMR and ¹³C NMR of diglycidyl esters

Diglycidyl tartrate (DT, **2a**) Yield 56.8%

¹H NMR (500 MHz, CDCl₃) δ 4.66 (ddd, *J* = 9.1, 5.6, 2.5 Hz, 2H), 4.62 (t, *J* = 3.0 Hz, 1H), 4.59 (t, *J* = 3.0 Hz, 1H), 4.15 (ddd, *J* = 12.3, 6.0, 1.7 Hz, 1H), 4.09 (ddd, *J* = 12.1, 6.7, 1.8 Hz, 1H), 3.33 (d, *J* = 7.3 Hz, 2H), 3.29 – 3.23 (m, 2H), 2.88 (dt, *J* = 7.7, 4.5 Hz, 2H), 2.71 (dd, *J* = 4.2, 2.6 Hz, 1H), 2.69 (dd, *J* = 4.7, 2.6 Hz, 1H). ¹³C NMR (126 MHz, CDCl₃) δ 171.13 (s), 77.36 (s), 77.11 (s), 76.85 (s), 72.26 (s), 49.16 (s), 44.64 (s).

Diglycidyl malate (DM, **2b**) Yield 46.2%

¹H NMR (500 MHz, CDCl₃) δ 4.55 (t, *J* = 12.0 Hz, 2H), 4.44 (d, *J* = 12.2 Hz, 1H), 4.00 (s, 1H), 3.93 (dd, *J* = 12.1, 6.3 Hz, 1H), 3.34 (s, 1H), 3.20 (dd, *J* = 13.3, 2.5 Hz, 2H), 2.96 – 2.86 (m, 2H), 2.86 – 2.79 (m, 2H), 2.63 (d, *J* = 1.5 Hz, 2H). ¹³C NMR (126 MHz, CDCl₃) δ 172.96 (s), 170.08 (s), 77.31 (s), 77.06 (s), 76.80 (s), 65.45 (s), 49.05 (d, *J* = 17.8 Hz), 44.58 (s), 38.46 (s).

Diglycidyl succinate (DS, **2c**) Yield 49.8%

¹H NMR (500 MHz, CDCl₃) δ 4.41 (d, *J* = 3.0 Hz, 1H), 4.39 (d, *J* = 3.0 Hz, 1H), 3.91 (dd, *J* = 12.3, 6.3 Hz, 2H), 3.17 (d, *J* = 2.9 Hz, 2H), 2.81 (t, *J* = 4.5 Hz, 2H), 2.66 (s, 4H), 2.61 (dd, *J* = 4.8, 2.6 Hz, 2H).

¹³C NMR (125 MHz, CDCl₃) δ 171.89 (s), 77.91 – 76.73 (m), 76.80 – 76.73 (m), 76.80 – 76.37 (m), 65.22 (s), 49.22 (s), 44.59 (s), 28.79 (s).

2. Characterization of D-PEIs

DT-PEI: ^1H NMR (500 MHz, D_2O) δ 4.43 (d, $J = 4.2$ Hz, 2H), 3.71 (s, 2H), 3.49 (dd, $J = 11.6, 4.1$ Hz, 3H), 3.41 (dd, $J = 11.4, 6.2$ Hz, 3H), 3.30 (s, 5H), 2.58 (d, $J = 31.2$ Hz, 55H).

DM-PEI: ^1H NMR (500 MHz, D_2O) δ 4.36 (s, 2H), 3.71 (s, 2H), 3.59 – 3.44 (m, 4H), 3.41 (d, $J = 4.4$ Hz, 4H), 3.23 (s, 5H), 2.58 (d, $J = 29.3$ Hz, 58H).

DS-PEI: ^1H NMR (500 MHz, D_2O) δ 4.44 (d, $J = 4.1$ Hz, 2H), 3.72 (s, 2H), 3.50 (dd, $J = 11.6, 4.0$ Hz, 3H), 3.42 (s, 3H), 3.30 (s, 5H), 2.63 (t, $J = 37.5$ Hz, 57H).

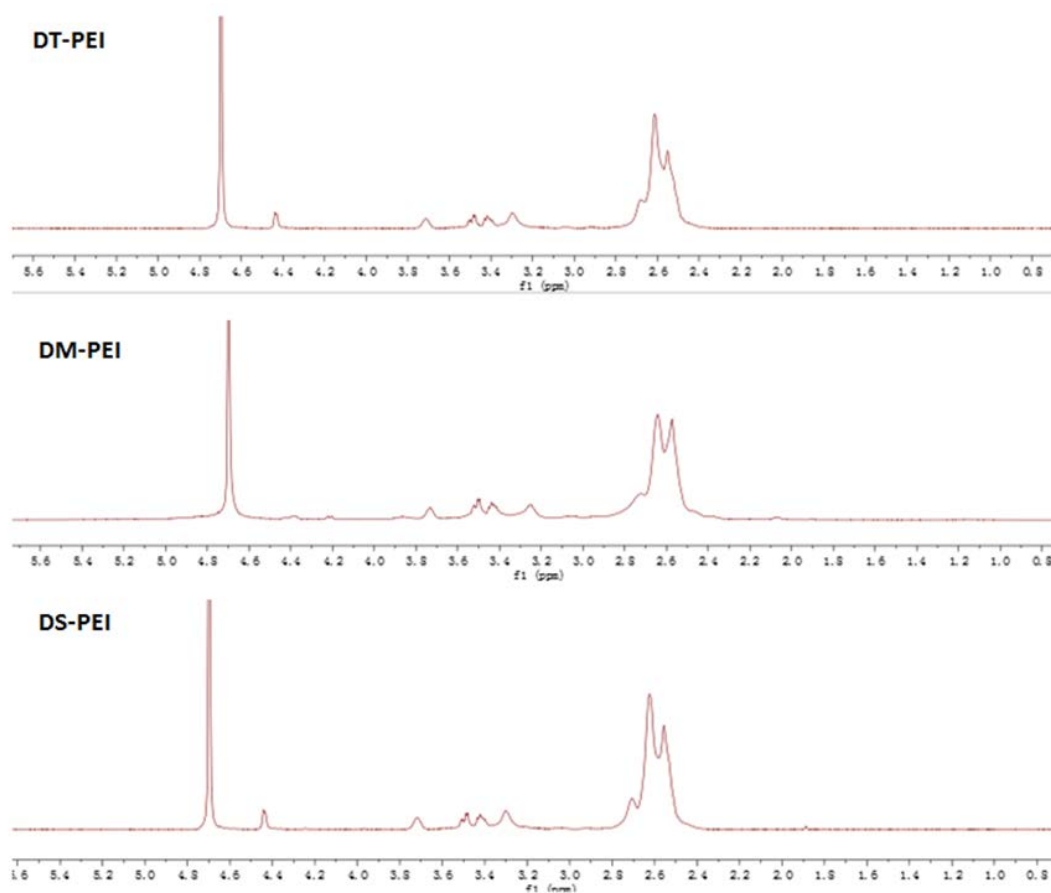


Fig. S1. ^1H NMR of D-PEI

Table S1 Molecular weight of D-PEIs

D-PEIs	Molecular weight
DT-PEI	15803 (PDI = 1.15)
DM-PEI	16356 (PDI = 1.47)
DS-PEI	15770 (PDI = 1.62)

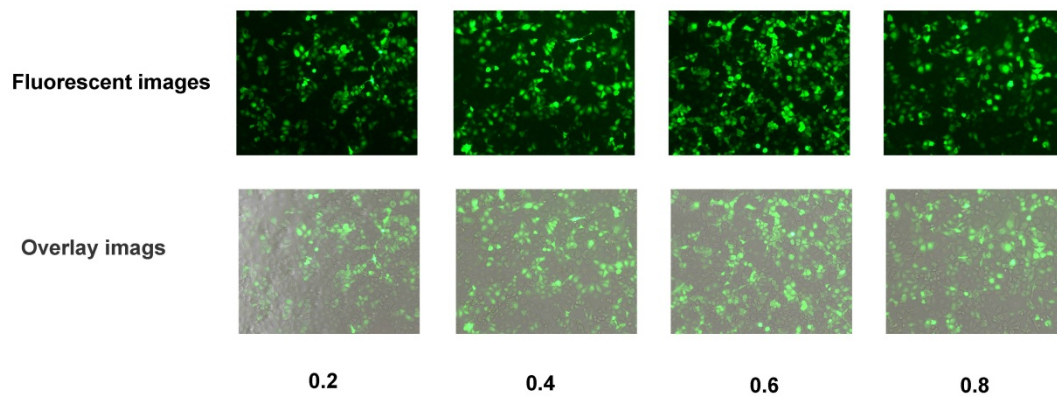


Fig. S2. GFP expressed in A549 cell line transfected with MNP@DT-PEI/DNA at the weight ratio MNP/DNA of 0.2, 0.4, 0.6 and 0.8 with 30min incubation (the weight ratio of DT-PEI/DNA=4). (magnification of 400×)