

## Electronic supplementary data

### Grafting zwitterionic polymer chains on PEI as a convenient strategy to enhance gene delivery performance

Jun Sun,<sup>a</sup> Fang Zeng,<sup>\*a</sup> Haoliang Jian,<sup>a</sup> and Shuizhu Wu,<sup>\*ab</sup>

<sup>a</sup>Department of Polymer Science, College of Materials Science & Engineering, South China University of Technology, Guangzhou 510640, China

<sup>b</sup>State Key Laboratory of Luminescent Materials & Devices, South China University of Technology, Guangzhou 510640 (P. R. China). E-mail: shzhwu@scut.edu.cn; Tel: 86 20 22236262; Fax: 86 20 22236262.

#### Contents:

1. Calculation of mass percentage of PMPC in PEI-PMPC polymers and <sup>1</sup>H NMR spectra (Figures S1-3).
2. Buffering capacity of PEI 25K and three PEI-PMPC polymers (Figure S4).
3. Typical flow cytometry profiles for pEGFP transfection in Hela and HepG2 cell lines mediated by PEI 25K and PEI-PMPC<sub>11%</sub> with or without serum (Figure S5).

### Calculation of mass percentage of PMPC in PEI-PMPC polymers:

The mass percentage of PMPC is defined as follows:

$$MPC\% = \frac{m_{MPC}}{m_{MPC} + m_{PEI}} * 100\% \quad (1-1)$$

The integral area of H<sub>d</sub>, H<sub>e</sub> and H<sub>c</sub> was normalized as 6. So the integral area of H<sub>g</sub> equals to 9/6 multiplied by the integral area of H<sub>d</sub>, H<sub>e</sub> and H<sub>c</sub>. The molecular weight of MPC is 295. The molecular weight of each repeat unit of PEI is 43. And each repeat unit of PEI contains four protons.

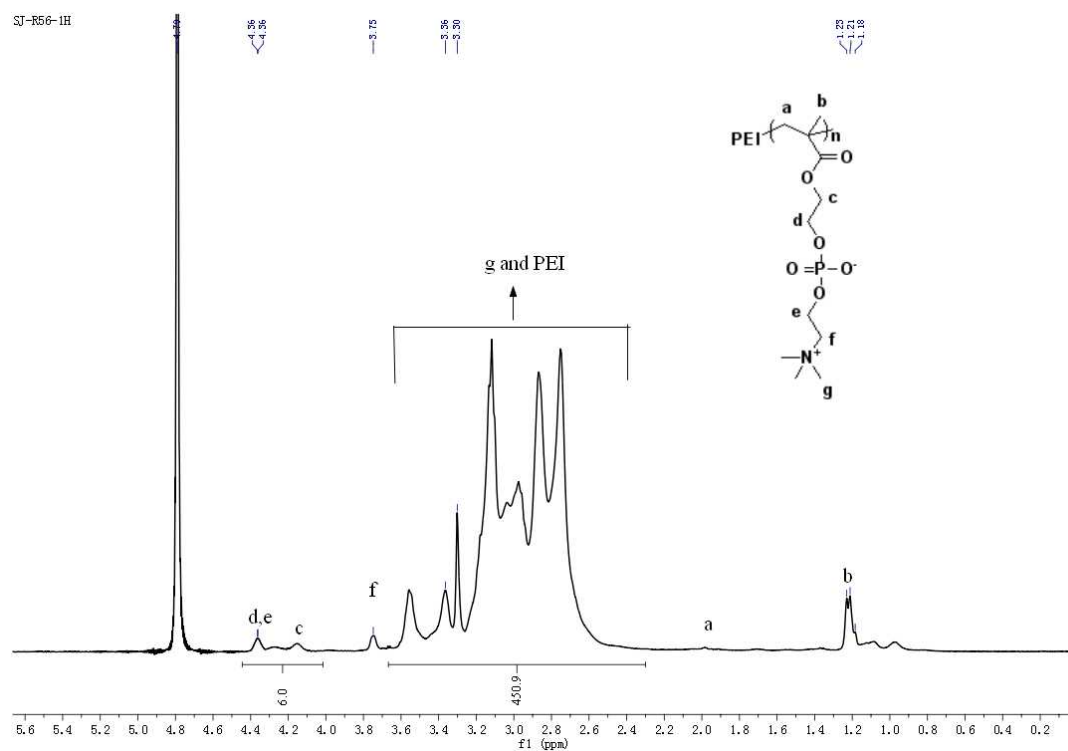
The equation for calculation is shown as follows:

$$\begin{aligned} MPC\% &= \frac{m_{MPC}}{m_{MPC} + m_{PEI}} * 100\% \\ &= \frac{295}{\left( \frac{S_{PEI,g} - \frac{9}{6} S_{d,e,c}}{4} * 43 \right) + 295} * 100\% \\ &= \frac{295}{\left( S_{2.30-3.65} - \frac{9}{6} S_{4.0-4.5} \right) * 43 + 295} \times 100\% \end{aligned} \quad (1-2)$$

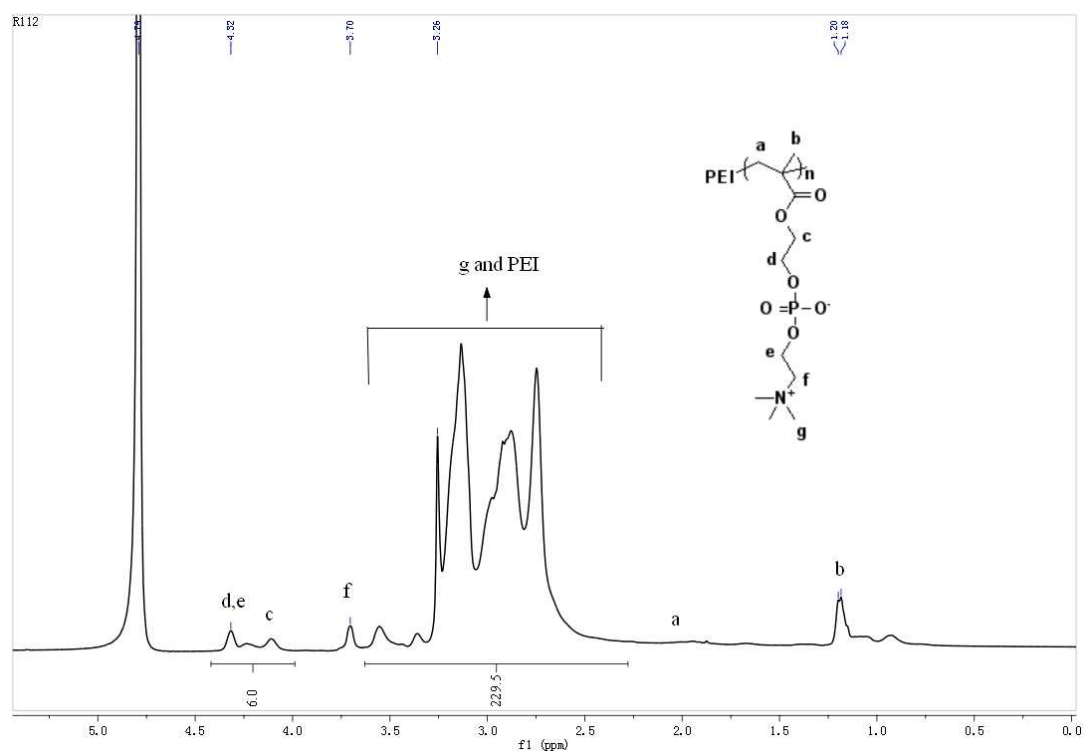
For example, the calculation for the PEI-PMPC<sub>6%</sub> is given below:

$$\begin{aligned} MPC\% &= \frac{295}{\left( S_{2.30-3.65} - \frac{9}{6} S_{4.0-4.5} \right) * 43 + 295} \times 100\% \\ &= \frac{295}{(450.9 - 9) * 43 + 295} \times 100\% = 5.85\% \end{aligned}$$

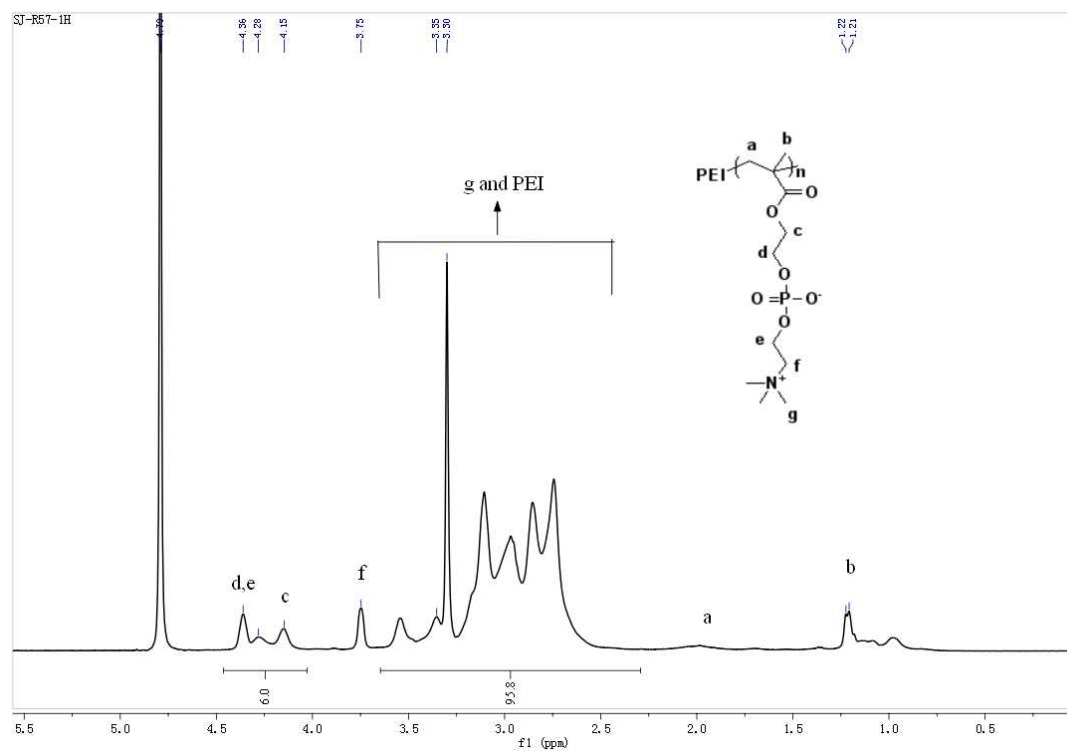
The mass percentage of PMPC in the polymer sample was estimated as 5.85%, and the sample was referred to as PEI-PMPC<sub>6%</sub>. The mass percentage for PEI-PMPC<sub>11%</sub> and PEI-PMPC<sub>24%</sub> were estimated similarly.



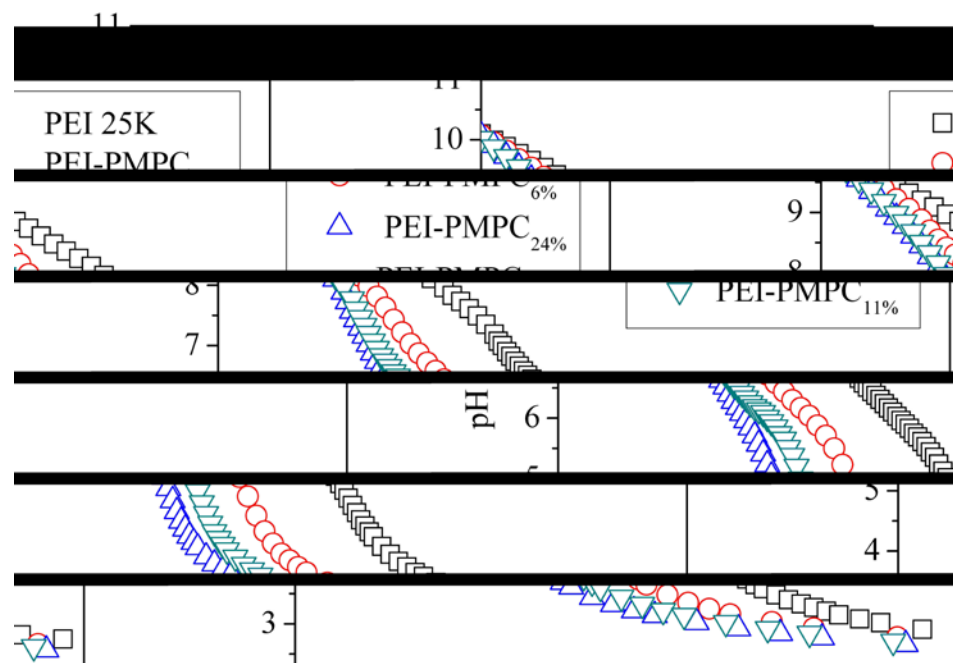
**Figure S1.**  $^1\text{H}$  NMR spectrum of PEI-PMPC<sub>6%</sub> (in  $\text{D}_2\text{O}$ )



**Figure S2.**  $^1\text{H}$  NMR spectrum of PEI-PMPC<sub>11%</sub> (in  $\text{D}_2\text{O}$ )

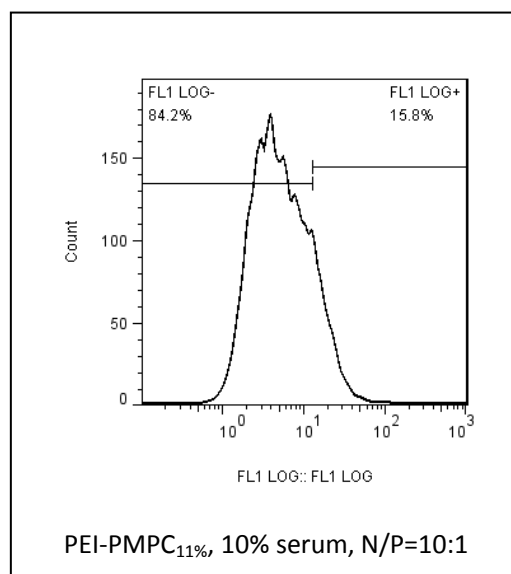
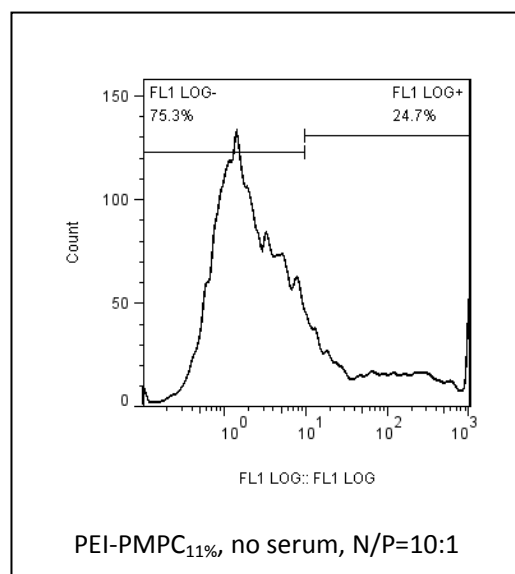
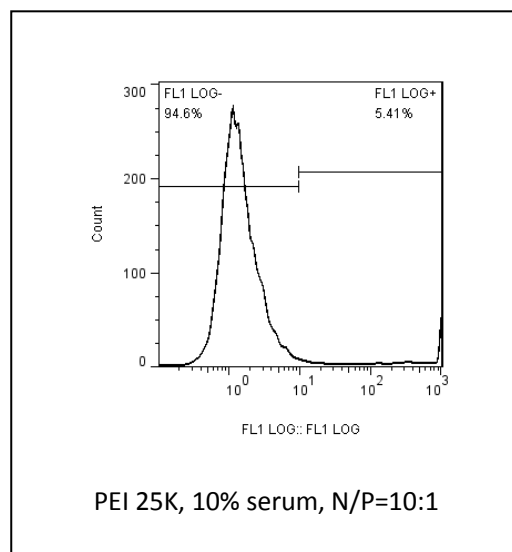
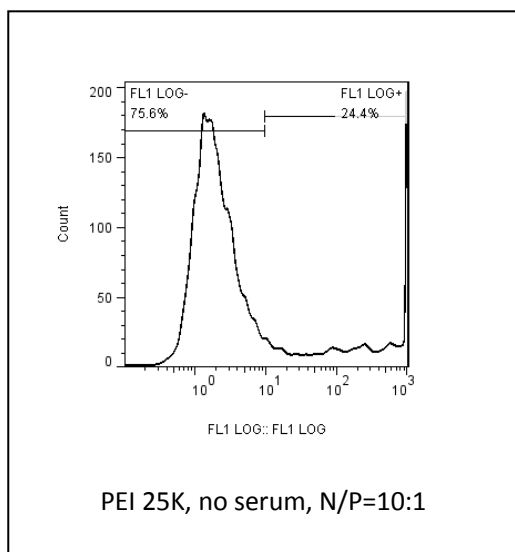


**Figure S3.**  $^1\text{H}$  NMR spectrum of PEI-PMPC<sub>24%</sub> (in  $\text{D}_2\text{O}$ )

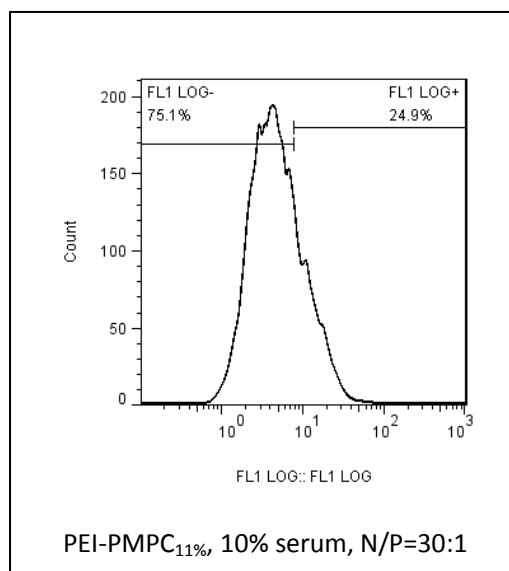
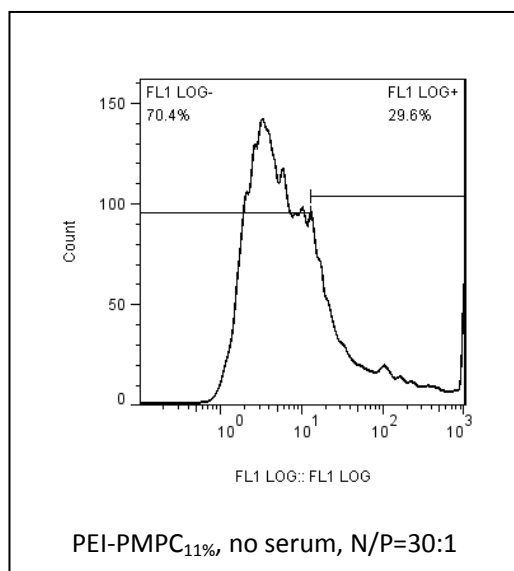
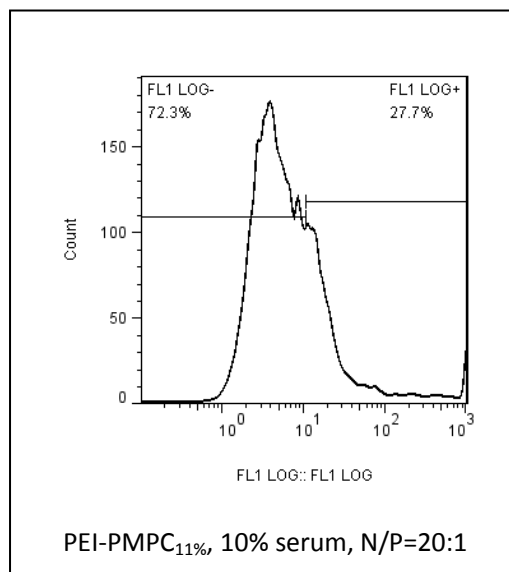
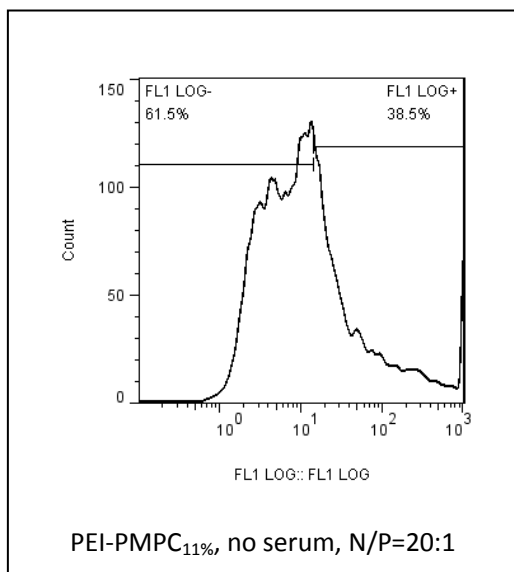


**Figure S4.** Buffering capacity of PEI 25K and three PEI-PMPC polymers determined by performing acid–base titration from pH 10 to pH 3

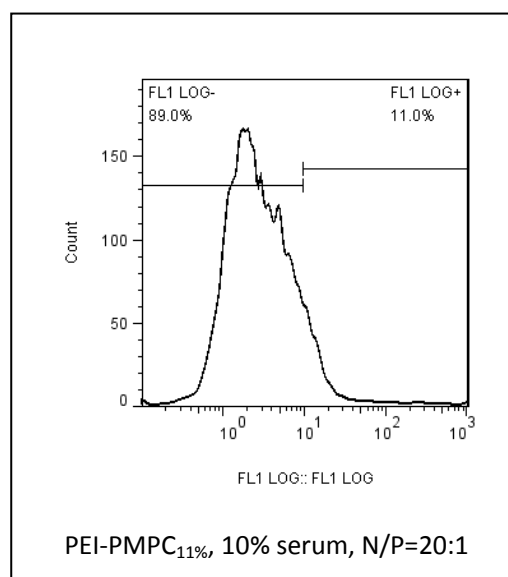
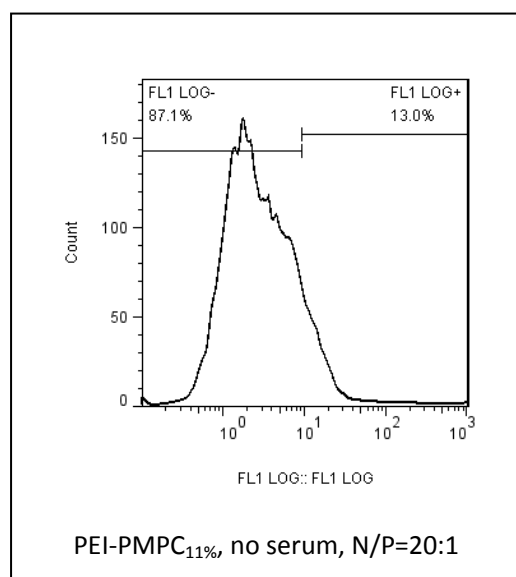
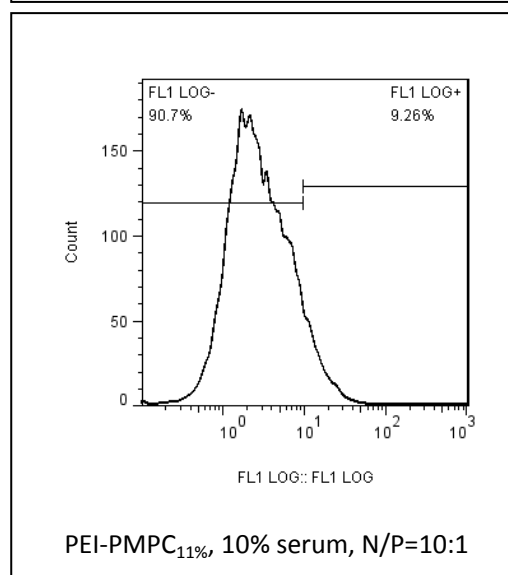
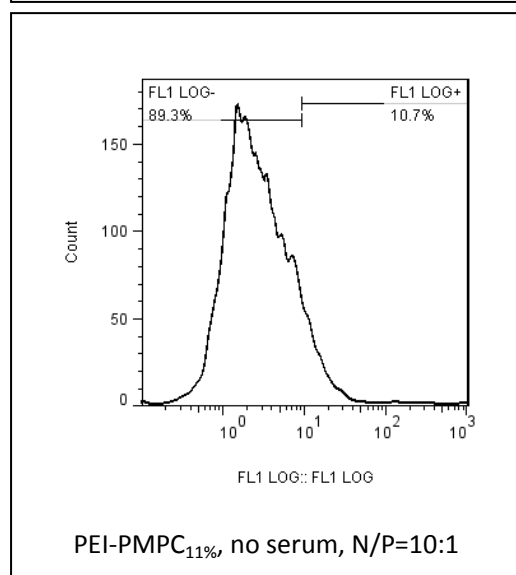
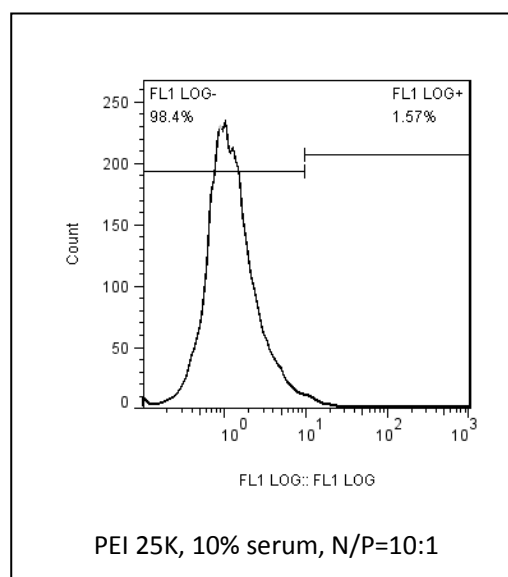
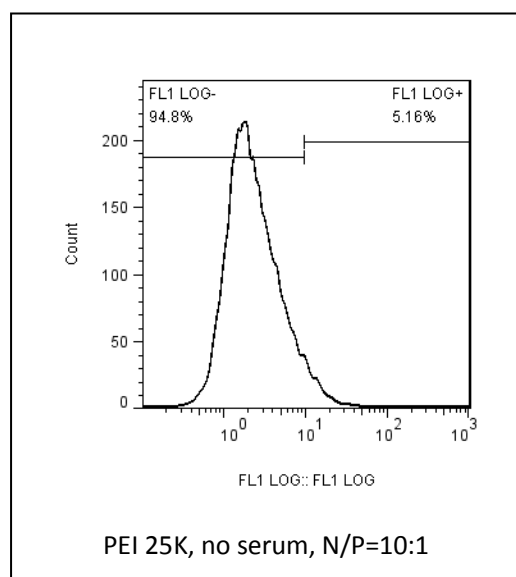
Hela:



Hela:

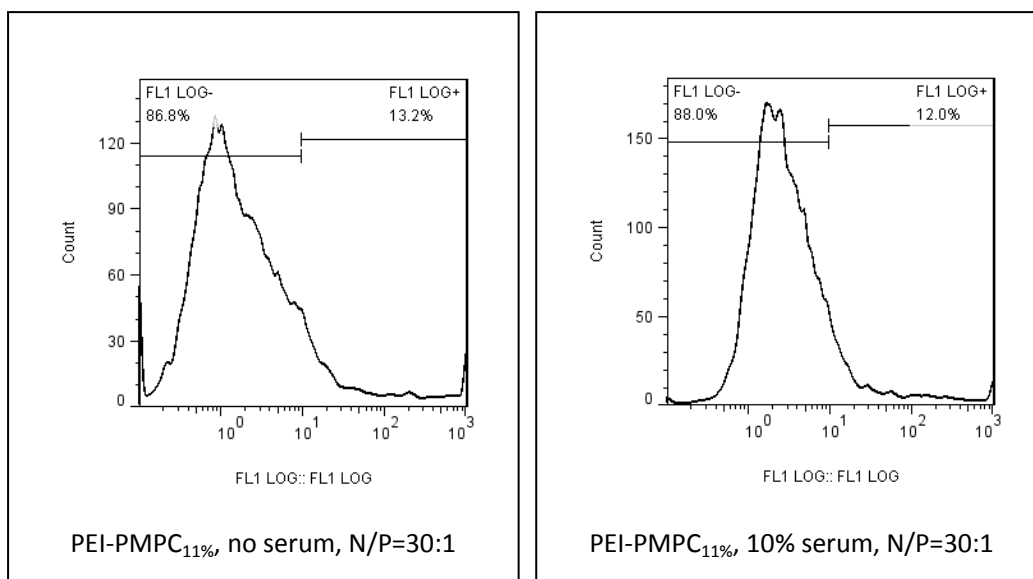


# HepG2:





HepG2:



**Figure S5.** Typical flow cytometry profiles for pEGFP transfection in HeLa and HepG2 cell lines mediated by PEI 25K and PEI-PMPC<sub>11%</sub> with or without serum.