**Table S1.** Strains used in this study.

| Strains | Genotype | Source |
|---|---|---|
| *E. coli* DH5a | F80d,lacZΔ(lacZYA_argF),U169,deoR,recAl,endAl,phoA, hsdR17 (r -k , mk+) supE44λ_thi -1, gyrA96, relA1 | Transgen |
| *E. coli* BL21(DE3) | F-, ompT, $hsdS_B$ ($r_B$-, $m_B$-), gal, dcm (DE3) | Transgen |
| *E. coli* TOP10 | F-, mcrA Δ(mrr-hsd RMS-mcr BC), φ80 lacZ ΔM15ΔlacX74, recA1, araΔ139Δ(ara-leu)7697, galU, galK, rpsL($Str^R$ ), endA1, nupG | This study |
| ECPLD1 | *E. coli* BL21(DE3) carrying pET28a-SaPLD | This study |
| ECPLD2 | *E. coli* BL21(DE3) carrying pET22b-SaPLD | This study |
| ECPLD3 | *E. coli* BL21(DE3) carrying pET22b-OmpA-SaPLD | This study |
| ECPLD4 | *E. coli* TOP10 carrying pBAD-gIIIC-OmpA-SaPLD | This study |

**Table S2.** Plasmids used in this study.

| Plasmids | Genotype | Source |
|---|---|---|
| pET28a | Kana, T7 promoter | GENEWIZ |
| pET22b- PelB | Amp, T7 promoter, pelB signal sequence | GENEWIZ |
| pBAD-gIIIC | Amp, pBAD promoter | GENEWIZ |
| pET28a-SaPLD | pET28a carrying PLD gene from *Streptomyces antibioticus* | This study |
| pET22b-SaPLD | pET22b carrying PLD gene from *Streptomyces antibioticus* | This study |
| pET22b-DsbA-SaPLD | pET22b carrying PLD gene from *Streptomyces antibioticus*, pelB signal sequence replaced by DsbA signal sequence | This study |
| pET22b-FhuD-SaPLD | pET22b carrying PLD gene from *Streptomyces antibioticus*, pelB signal sequence replaced by FhuD signal sequence | This study |
| pET22b-TorA-SaPLD | pET22b carrying PLD gene from *Streptomyces antibioticus*, pelB signal sequence replaced by TorA signal sequence | This study |
| pET22b-OmpA-SaPLD | pET22b carrying PLD gene from *Streptomyces antibioticus*, pelB signal sequence replaced by OmpA signal sequence | This study |
| pET22b-PhoA-SaPLD | pET22b carrying PLD gene from *Streptomyces antibioticus*, pelB signal sequence replaced by PhoA signal sequence | This study |
| pBAD-gIIIC-OmpA-SaPLD | pBAD-gIIIC carrying PLD gene from *Streptomyces antibioticus* and OmpA signal sequence | This study |

**Table S3.** Primers and synthetic oligos used in this study.

| No. | Primer | Nucleotide sequence (5' >3') |
|---|---|---|
| 1 | DsbA-SaPLD-1F | GCCTGGTGCTGGCGTTTAGCGCTAGCGCCATGGATATCGGAATTAATTCGGATCCGG |
| 2 | DsbA-SaPLD-1R | CTCGAGTGCGGCCGCAAGCTTGCCCGCTTGGCGCGC |
| 3 | DsbA-SaPLD-2F | AACTTTAAGAAGGAGATATACATATGAAAAAAATTTGGCTGGCGCTGGCGGGCCTGGTGCTGGCGTTTAGC |
| 4 | DsbA-SaPLD-2R | CTCGAGTGCGGCCGC |
| 5 | pBAD-IF | GGCTAACAGGAGGAATTAACCATGAAAAAAACCGCGATTGCGATTGCGG |
| 6 | pBAD-IR | TGAGTTTTTGTTCTAGACCGCCCGCTTGGCGCGC |
| 7 | pBAD-VF | GGTCTAGAACAAAAACTCATCTCAGAAG |
| 8 | pBAD-VR | GGTTAATTCCTCCTGTTAGCC |
| 9 | mrcB-up-F | CAAAGGCAAAGGGCGTAAG |
| 10 | mrcB-up-R | GATCACCCCACCACCAGCAAATCCGGGAAACC |
| 11 | mrcB-down-F | CGGATTTGCTGGTGGTGGGGTGATCTCTCCTCAG |
| 12 | mrcB-down-R | GGCACGTTCATCGAACGGGTC |
| 13 | dacB-up-F | CTCTTGAATATTCCTGATAGGGCAAGTC |
| 14 | dacB-up-R | GCCTGTTTTAACTCATTTCAAGCGTCGTGGTAAAACG |
| 15 | dacB-down-F | CGACGCTTGAAATGAGTTAAAACAGGCGGGTATCAC |
| 16 | dacB-down-R | CCAGGTTATATACCCCCTGCAAC |

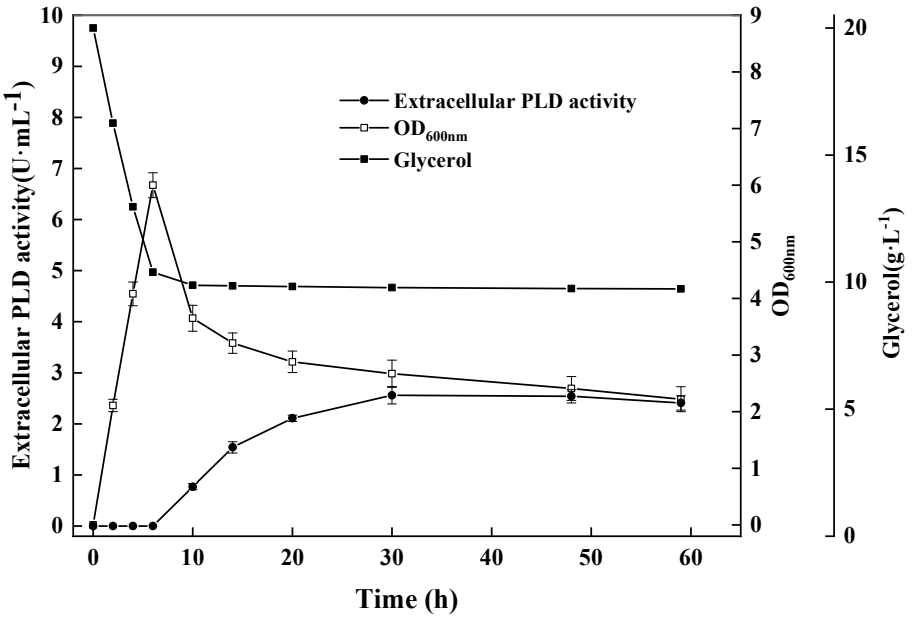


**Figure S1.** PLD production, cell growth and glycerol consumption by the engineered ECPLD4 after knockout of mrcB and dacB.

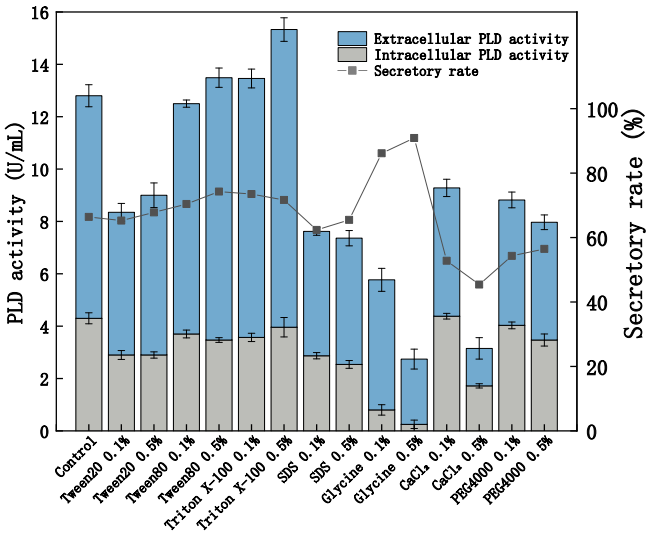


**Figure S2.** Comparison of the effects of different surfactants with 0.1% and 0.5% addition level on PLD production.