Supplementary Information

Membrane protein extraction and purification using partially-esterified SMA polymers

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Supplementary Figure 1. Separation of lipid-only SMALPs from free SMA polymer by size exclusion chromatography. Absorbance traces at 260 nm (dashed lines) or 280 nm (solid lines) from a Superdex 200 10/300 column loaded with either SMA1440 polymer alone (blue) or lipid-only SMALPs formed using SMA1440 (orange).
Supplementary Figure 2. NMR spectra for the polymers. $^1$H-NMR spectra (A-C) and $^{13}$C-NMR spectra (D-F) for the partially esterified polymers SMA 2625 (A & D), SMA 1440 (B & E) and SMA 17352 (C & F). The anhydride form of each polymer was dissolved in deuterated acetone and analysed in a 300MHz Brucker NMR spectrometer. Peaks corresponding to the various chemical environments within the structures (inset) have been labelled (a-h).
Supplementary Figure 3. FTIR spectra for the polymers. FTIR spectra for the polymers SMA 2000, SMA 2625, SMA 1440 and SMA 17352, in the pre-hydrolysis anhydride form (A) and post-hydrolysis acid form (B).
Supplementary Figure 4. Analysis of the stability of SMALP formed from each polymer Lipid-only SMALPs formed with SMA 2000 (black circle), SMA 2625 (red open circle), SMA 1440 (blue triangle) and SMA 17352 (open green triangle) were analysed by DLS using a DynaPro Plate Reader III and DYNAMICS software with a laser wavelength of 825.4 nm and a detector angle of 150°. A; For time course studies, 100 measurements consisting of 5 acquisitions of 5 s were carried out over the course of 1 hour to monitor lipid-only SMALP stability. Measurements were taken at a temperature of 25 °C. B; For thermostability measurements, purified lipid-only SMALPs were measured. Scans were carried out at a starting point of 25 °C, with discrete 5 °C temperature increments, up to 65 °C. Each increase in temperature was maintained to establish equilibrium before data collection.
Supplementary Figure 5. Partially esterified SMA polymers can be used for affinity purification of various membrane protein families or expression systems. The secondary active transporters LeuT and GltpH were expressed in E. coli, and the tetraspanin CD81 in P. pastoris. Membranes were solubilised with SMA polymers and purified by Ni-NTA affinity chromatography. Samples were analysed by SDS-PAGE and stained with InstantBlue.