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Supporting Information

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Distinct Network Morphologies from In Situ Polymerization of Microtubules in Giant Polymer-Lipid Hybrid Vesicles

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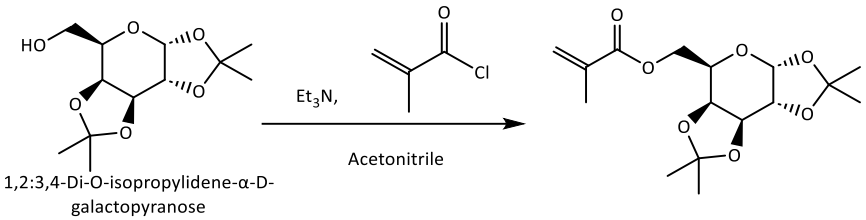


Scheme S1. Polymerization scheme of the 6-O-methacryloyl-1,2:3,4-di-O-isopropylidene-α-galactopyranose monomer (proGalacMA).

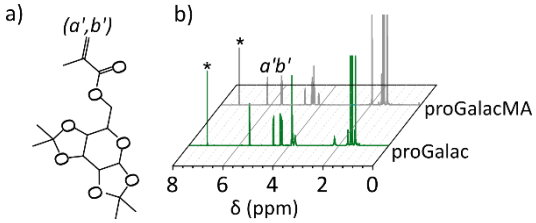
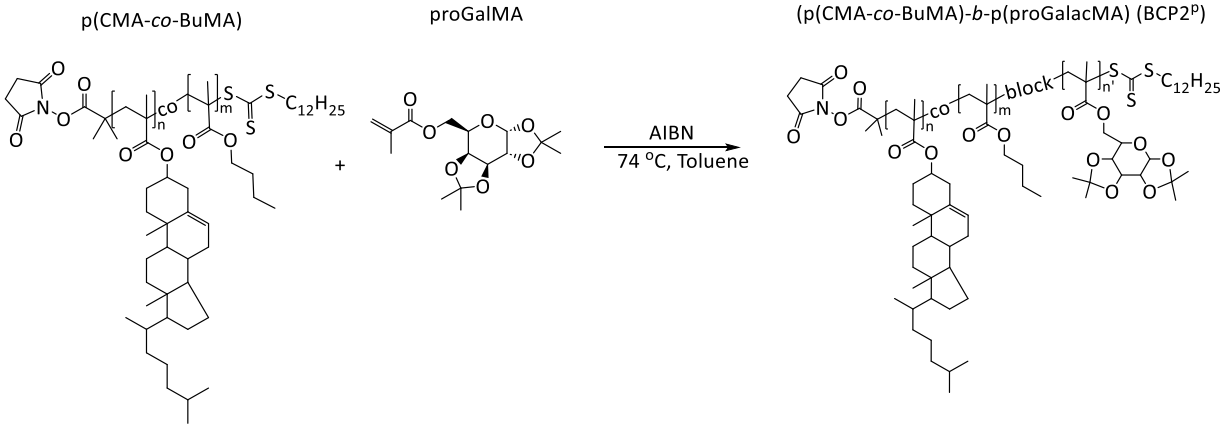
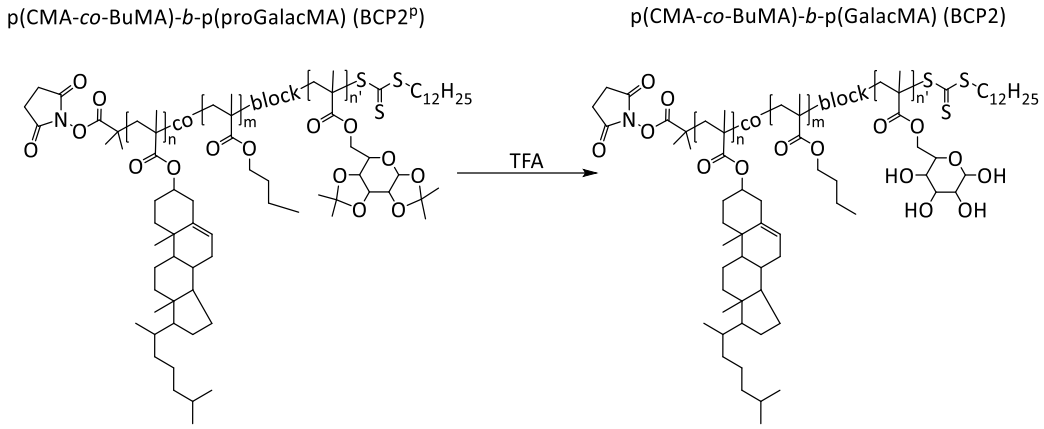


Figure S1. Structure (a) and ^{1}H NMR (b) of the proGalac and proGalacMA monomers. The ^{1}H NMR was measured in $CDCl_3$ (* indicates the solvent peak).



Scheme S2. Polymerization scheme of poly(cholesteryl methacrylate-*co*-butyl methacrylate)-*block*-poly(6-O-methacryloyl-D-galactopyranose) (p(CMA-*co*-BuMA)-*b*-p(proGalacMA), BCP2^p).



Scheme S3. Deprotection of BCP2^{p} (p(CMA-*co*-BuMA)-*b*-p(proGalacMA)).

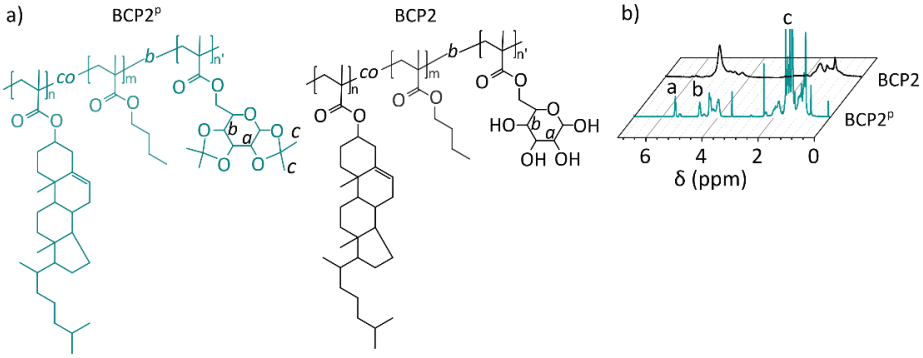


Figure S2. Structure (a) and ^{1}H NMR (b) of p(CMA-*co*-BuMA)-*b*-p(proGalacMA) (BPC2^{p}, turquoise) in $CDCl_3$ and p(CMA-*co*-BuMA)-*b*-p(GalacMA) (BCP2, black) in pyridine *d-8*.

Table S1. Composition of the different oil/polymer-lipid mixtures.

Sample	DOPC (mg)	Cholesterol (mg)	BCP1 (mg)	BCP2 (mg)	Ratio
GUV^{0}	5	0.069	-	-	100:0
GUV$^{2.5}$	5	0.138	-	-	97.5:2.5
GHV1$^{2.5}$	5	-	0.65	-	97.5:2.5
GHV1^{5}	5	-	1.3	-	95:5
GHV2$^{2.5}$	5	-	-	0.65	97.5:2.5
GHV2^{5}	5	-	-	1.3	95:5
GHV2^{10}	5	-	-	2.6	90:10

It should be noted that, in all cases, the lipid mixture was mixed with 15 mL silicone oil and 3.8 mL mineral oil.

Table S2. Composition of the encapsulant.

		Premix						
Sample	**Tubulin 165 µM (µL)**	**Glucose 231 mM (µL)**	**Optiprep (µL)**	**GTP 100 mM (µL)**	**DTT 40 mM (µL)**	**GMPCPP 10 mM (µL)**	**ddH_2O (µL)**	**5x BRB80 buffer (µL)**
0 mM GMPCPP	1.5	-	0.9	-		0	8	2
1 mM GMPCPP	1.5	-	0.9	-		1	5	2
2.5 mM GMPCPP	1.5	-	0.9	-		3	7	2
Empty vesicles	-	18.5	1.5	-		-	-	-
3 µM tubulin	0.2	-	0.5	1.25	0.5	-	25.75	10
11 µM tubulin	0.75	-	0.5	1.25	0.5	-	25.75	10
20 µM tubulin	1.5	-	0.9	1.25	0.5	-	25.75	10
3 µM tubulin	0.2	-	0.5	-		1	7	2
11 µM tubulin	0.75	-	0.5	-		1	7	2
20 µM tubulin	1.5	-	0.9	-		1	7	2

In all cases, 9 µL of the premix was always used to mix with the indicated volume of tubulin.

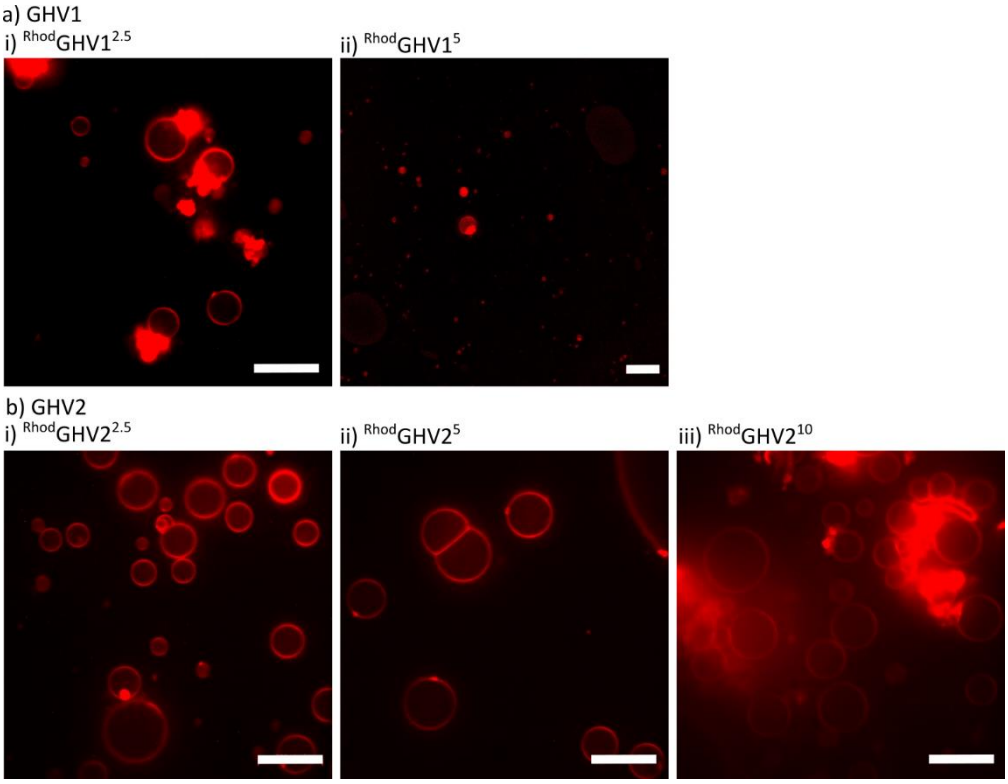


Figure S3. Representative SDCM images of $^{Rhod}GHV1^{n}$ (a) and $^{Rhod}GHV2^{n}$ (b) with 2.5% mol (i), 5% mol (ii) and 10% mol (iii) BCPX (red: ^{Rhod}PE; scale bar: 10 µm; n=3).

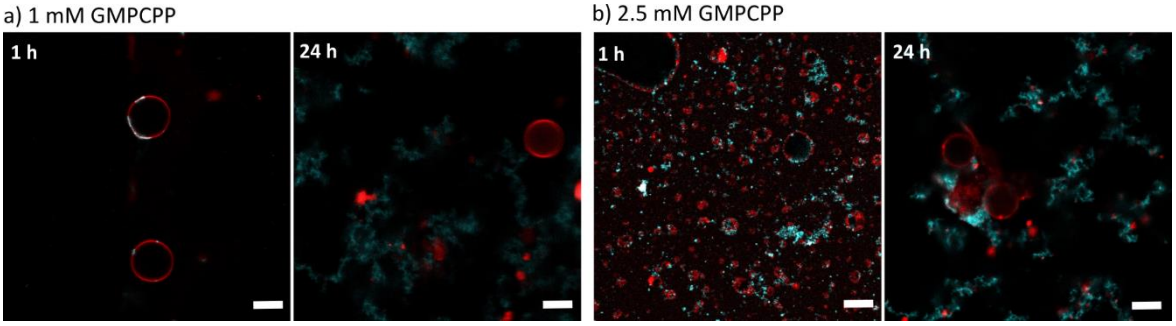


Figure S4. Representative CLSM images of $^{Rhod}GUV^{2.5}$ loaded with either 1 mM (a) or 2.5 mM (b) GMPCPP and tubulin after 1 h and 24 h incubation (red: ^{Rhod}PE, cyan: $tubulin^{F}$; scale bar: 10 µm; n = 3).

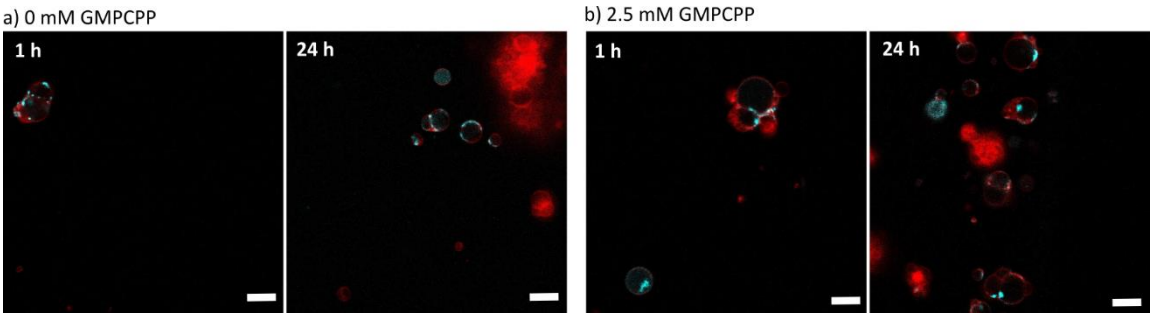


Figure S5. Representative CLSM images of $^{Rhod}GHV1^{2.5}$ loaded with either 0 mM (a) or 2.5 mM (b) GMPCPP and tubulin after 1 h and 24 h incubation (red: ^{Rhod}PE, cyan: $tubulin^{F}$; Scale bar: 10 µm; n = 3).