Electronic Supplementary Information

Molecular-engineered polymeric microcapsules assembled from Concanavalin A and glycogen with specific responses to carbohydrates

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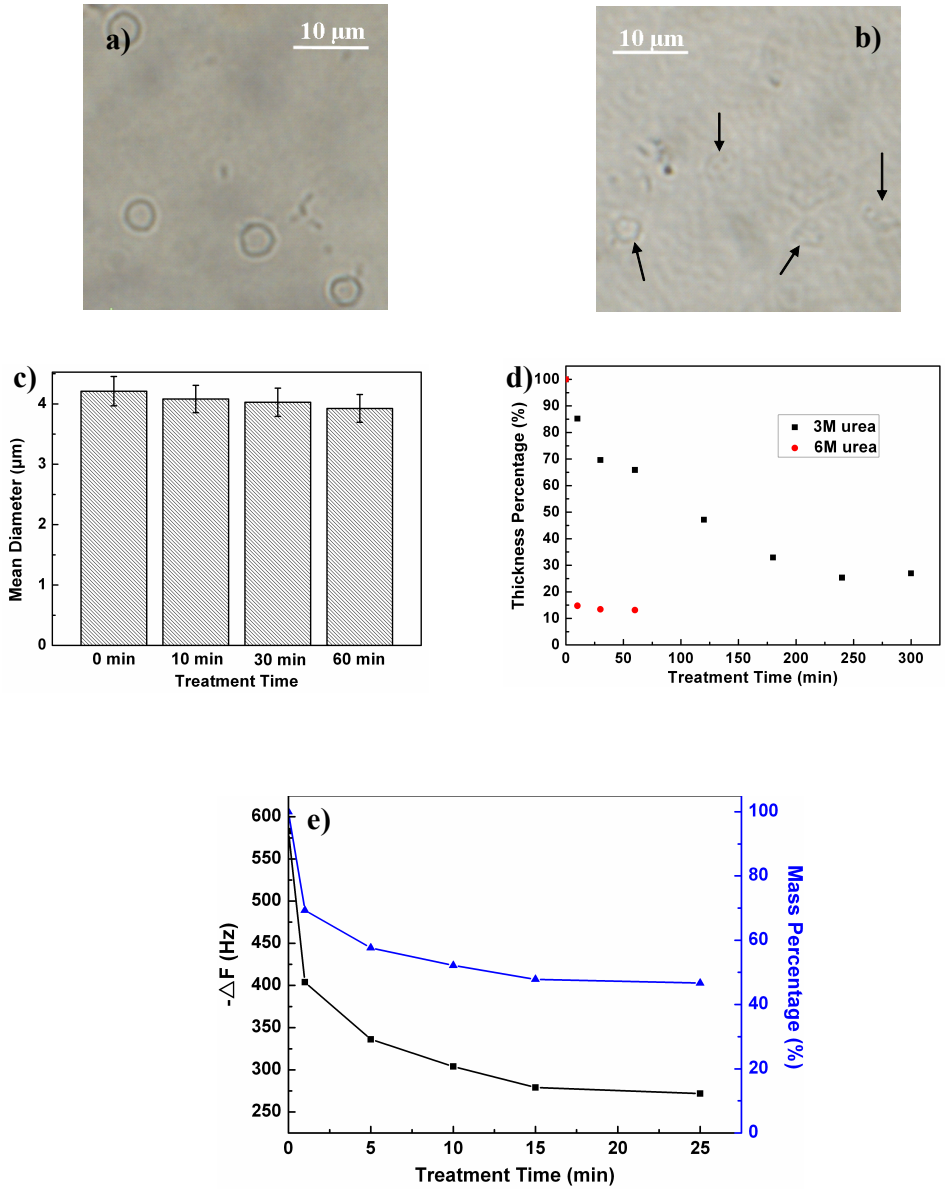

Fig. S1 Stability of Con A/glycogen multilayer films and microcapsules against urea treatments. Transmission optical images of the microcapsules treated with (a) 3 M urea solution for 1 hour and (b) 6 M urea solution for 10 minutes. (c) Mean capsule diameter under 3 M urea treatments as a function of time. (d) Thickness percentage of the remaining PEI/(Con A/glycogen)$_4$/Con A multilayer films treated with 3 M and 6 M urea solutions as a function of treatment time. (e) The frequency shift and mass percentage of PEI/(Con A-glycogen)$_4$/Con A multilayer films as a function of treatment time with 6 M urea, as measured with QCM-D in the dry state.

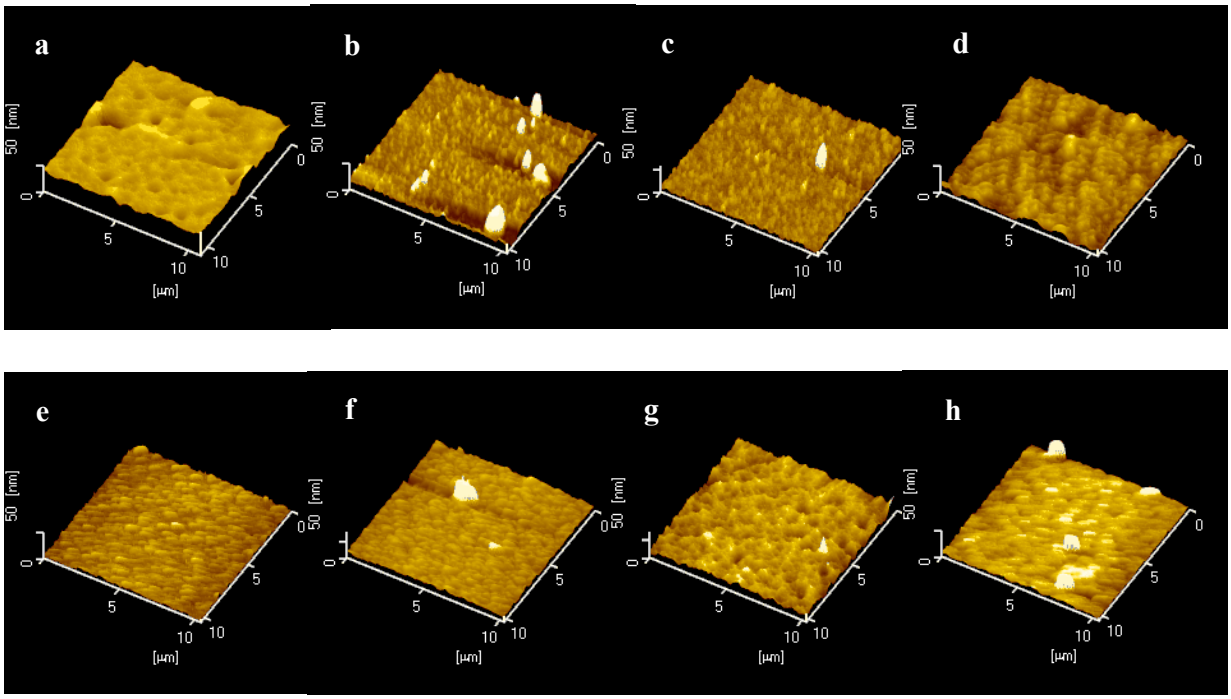

Fig. S2 Surface morphology of PEI/ (Con A/glycogen)$_4$/Con A multilayer films (a) in the original state, (b) 20 s after treated by 50 mg/ml glucose, (c) 10 minutes after treated by 10 mg/ml glucose, (d) 10 minutes after treated by 1 mg/ml glucose, (e) 30 minutes after treated by 50 mg/ml dextran-20 k, (f) 1 hour after treated by 10 mg/ml dextran-20 k, (g) 1 hour after treated by 1 mg/ml dextran-20 k, and (h) 1 hour after treated by 50 mg/ml dextran-40 k, as investigated by SFM.

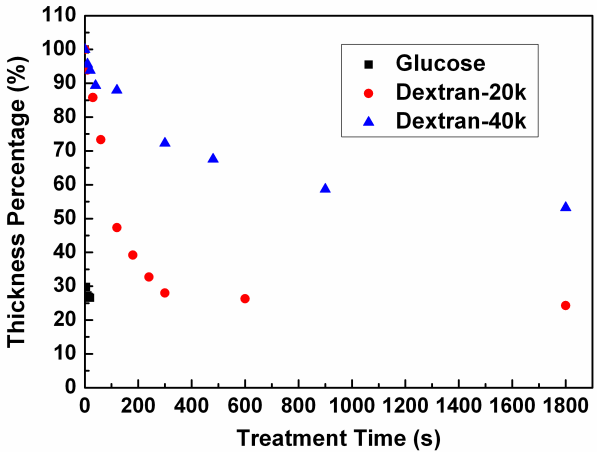

Fig. S3 Thickness percentage of the remaining PEI/ (Con A/glycogen)$_4$/Con A multilayer films as a function of time after treatments by 50 mg/ml glucose and dextran with M_w of 20 kDa and 40 kDa, as investigated with ellipsometry.

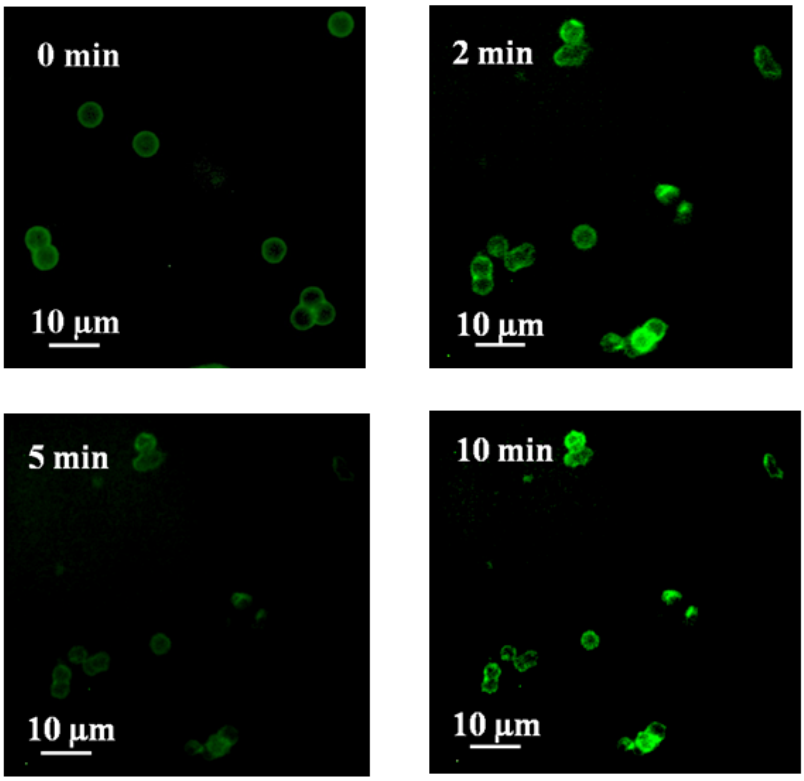

Fig. S4 Fluorescent images of the Con A/glycogen capsules under 50 mg/ml dextran-20k treatment with different treatment time. Here the image corresponding to 10 min is also presented in the

manuscript as Fig. 6c. It is re-presented here for a better comparison of the shells throughout the whole process.

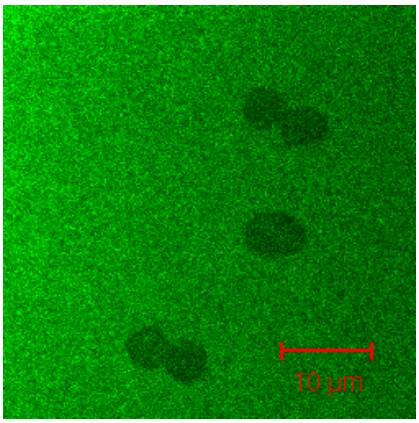

Fig. S5 CLSM image of the Con A/glycogen microcapsules after mixing with FITC-dextran (M_w 2,000 kDa) for 20 min.

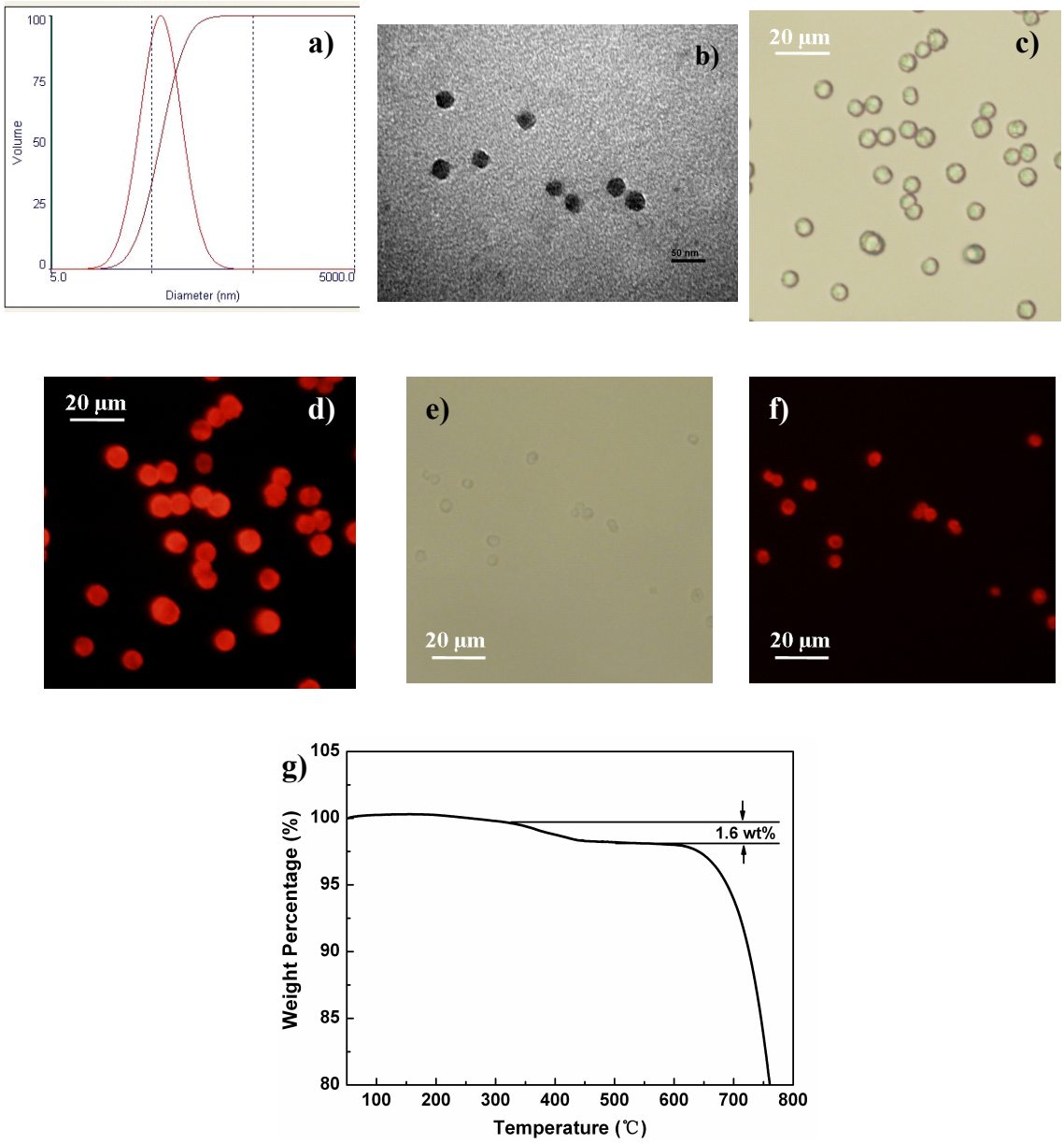

Fig. S6 The micelles-containing $CaCO_3$ hybrid microparticles. (a) Dynamic light scattering (DLS) and (b) TEM characterizations of the PS-*b*-PAA micelles. Transmission optical images of the micelles-doped $CaCO_3$ microparticles (c) before and (e) after treated with 0.1 M HCl showing the ring-like residues. (d) and (f) are corresponding fluorescent images of (c) and (e), respectively. (g) TGA curve of the micelles-doped $CaCO_3$ microparticles recorded at a heating rate of 20 ^{o}C/min in nitrogen environment. The mass loss for the copolymer was estimated by comparing the weight percentages between 300 ^{o}C and 500 ^{o}C.

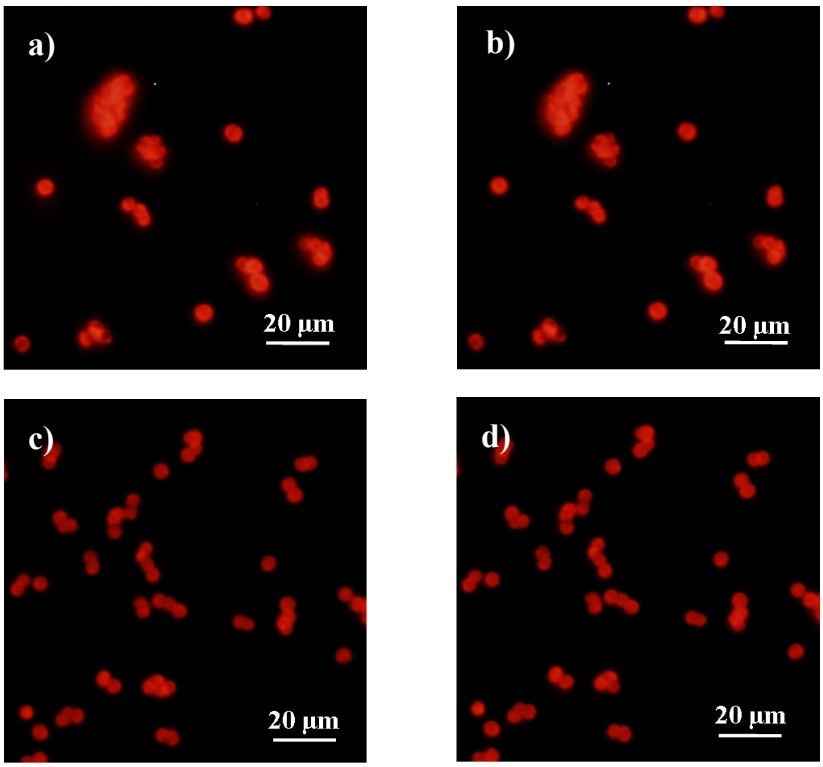

Fig. S7 Control experiments of the carbohydrate-triggered releasing of micelles. Fluorescent images of micelles-loaded Con A/glycogen microcapsules monitored for (a) 0 min and (b) 20 min without any treatment as well as micelles-loaded PAH/PSS microcapsules monitored for (c) 0 min and (d) 20 min after incubated in 10 mg/ml glucose.