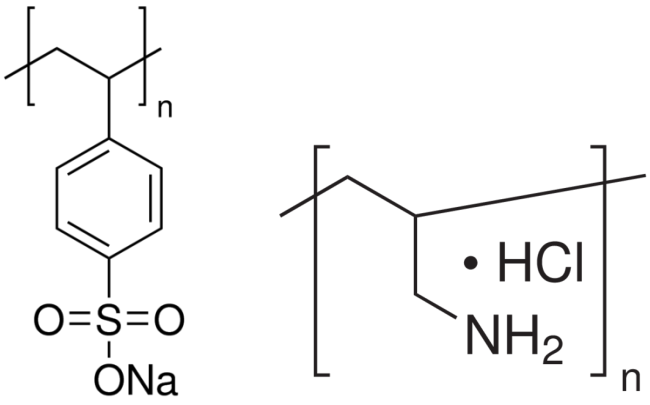

PSS **PAH**

Fig. S1. Structural formula of PSS and PAH.

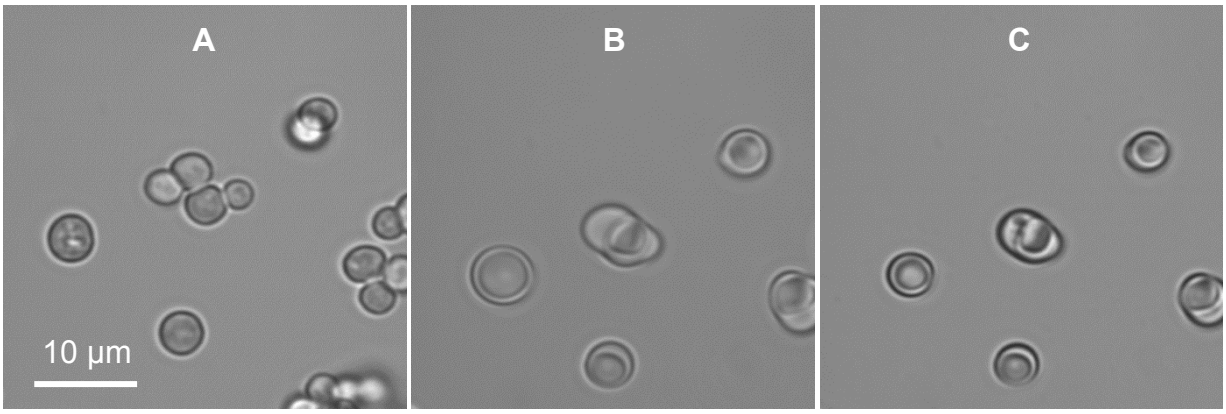

Fig. S2. Microcapsules in 1M HCl before (A) and after (B) formation of bubbles, and after acid replacement by water (C).

$CaCO_3$ remnants amount calculation.

Cumulative observed volume of gas bubbles formed inside one microcapsule in HCl solution is about 5 times bigger than volume of initial capsule. From 1 mol of $CaCO_3$ 1 mol of CO_2 is formed ($CaCO_3 + 2\ HCl \rightarrow CO_2 + H_2O + CaCl_2$).

Vaterite mass density is 2.645 g/cc. Pore volume in $CaCO_3$ microparticles was estimated 0.01141 cc/g (according to BET analysis). It corresponds to 3.02% of particle volume ($0.01141\ cc/g \times 2.645\ g/cc \times 100\ \%$) and mass density of porous microparticles 2.567 g/cc ($\frac{2.645\ g/cc}{1+0.0302}$). Molar weight of $CaCO_3$ is 100.1 g/mol. Molar density of porous microparticles is 0.02564 mol/cc ($\frac{2.567\ g/cc}{100.1\ g/mol}$), or **25.64 mol/L.**

According to ideal-gas equation of state (P=1 atm, can be bigger inside inflating bubble; T = 293.15 K) CO_2 molar density is no less than **0.0415 mol/L** ($\frac{1\ atm}{0.0821\ {}^{L*atm}/_{mol*K} \times 293.15\ K}$).

1 volume of microcapsule is formed by 25.64x mol of $CaCO_3$ ($25.64\ mol/L \times 1x\ L$). 5 volumes of gas are formed by 0.2075x mol of CO_2 ($0.0415\ mol/L \times 5x\ L$). Thus no less than **0.8% of initial $CaCO_3$** is required to form observed bubbles ($\frac{0.2075x\ mol}{25.46x\ mol} \times 100\ \%$).

Movie 1: $(PAH/PSS)_1$ microcapsules in 2.5M HCl, 1 second of movie corresponds to 2 minutes in real time.