**SUPPLEMENTARY INFO**

**Figure 1S:** $^1$H-NMR of PS-r-tBA (a) and PS-r-tBMA (b) with different ratio of acrylic monomers.

**Figure 2S:** FT-IR of PS-r-tBA (a) and PS-r-tBMA (b) with different ratio of acrylic monomers.

**Figure 3S:** GPC chromatographs of PS-r-tBA (a) and PS-r-tBMA (b) with different ratio of acrylic monomers.
Figure 4S: Water polymer solutions of PS-r-AA and PS-r-MAA with different polymer concentration. It is reported: (a) PS-r-MAA 1:0.61, (b) PS-r-AA 1:1.045, (c) PS-r-AA 1:1.57, (d) PS-r-AA 1:1.57 neutralized with Et$_3$N, (e) PS-r-MAA 1:1.93, (f) PS-r-AA 1:4.71, (g) PS-r-AA 1:4.23 AIBN.
Figure 5S: Emission spectra of water polymer solution with $2.5 \times 10^{-7}$ M of pyrene solution at different concentration of polymers, as example are reported (a) PS-r-AA 1:1.045, (b) PS-r-AA 1:1.045 neutralized with $\text{Et}_3\text{N}$, (c) PS-r-MAA 1:1.93, (d) PS-r-AA 1:4.23 AIBN.

Figure 6S: Viscosity as function of Shear of PS-r-AA 1:1.57 neutralize or with NaOH or with $\text{Et}_3\text{N}$ at 1wt% concentration (a), 5wt% (b) and 20 wt% (c).
Figure 7S: Cryo-TEM images of PS-r-MAA 1:0.61 (a), PS-r-MAA 1:1.93 (b), PS-r-AA 1:4.71 (c) PS-r-AA 1:4.23 AIBN (d). Only a few images are reported as examples.