

Electronic Supplementary Information (ESI)

**Responsive aqueous foams stabilised by silica nanoparticles
hydrophobised *in situ* with a switchable surfactant**

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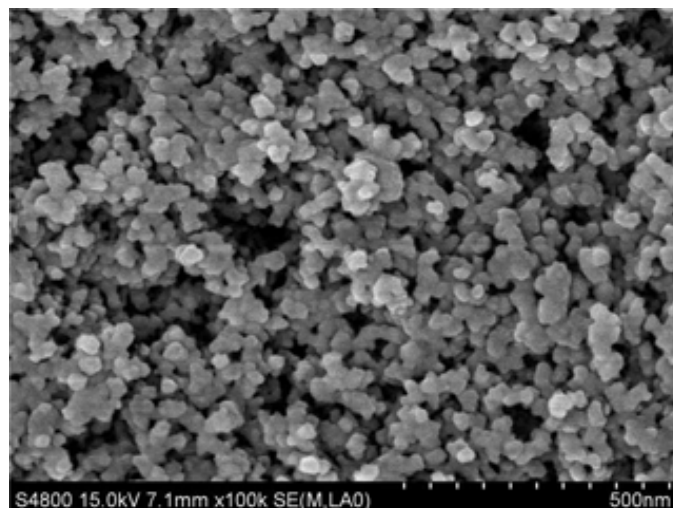


Figure S1. Scanning electron microscopy image⁴¹ of powdered silica nanoparticles (HL-200) with a BET surface area of $200 \pm 20 \text{ m}^2 \text{ g}^{-1}$.

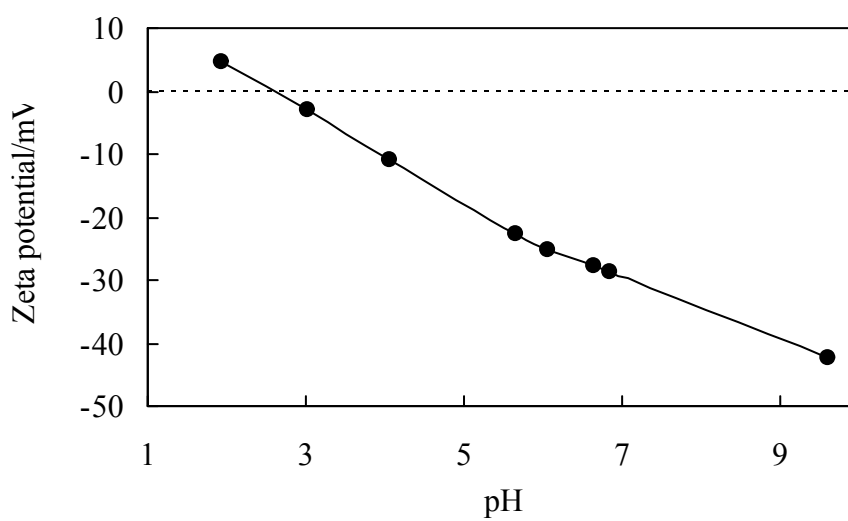


Figure S2. Zeta potentials of 0.1 wt.% silica nanoparticles dispersed in aqueous solutions of different pH, measured 24 hr. after dispersion at 25°C.

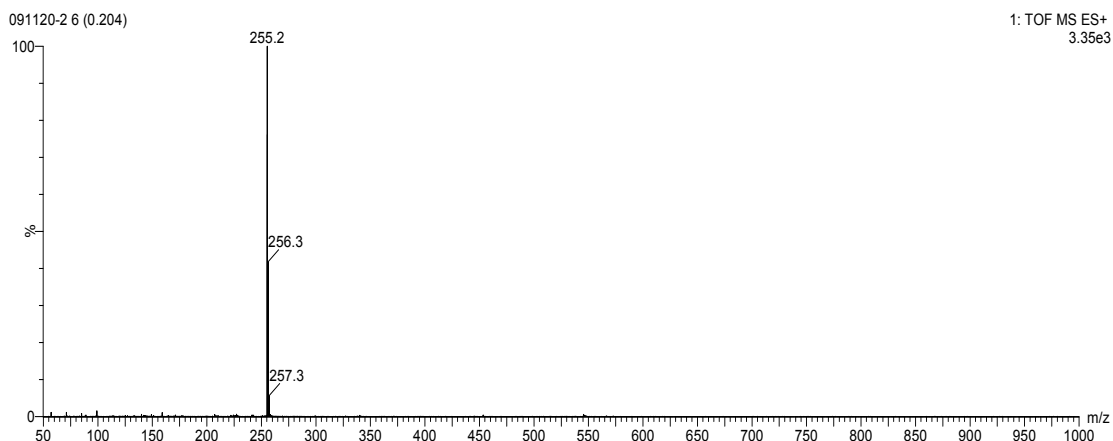


Figure S3. Mass spectrum of *N'*-dodecyl-*N,N*-dimethylacetamidinium bicarbonate.⁴¹

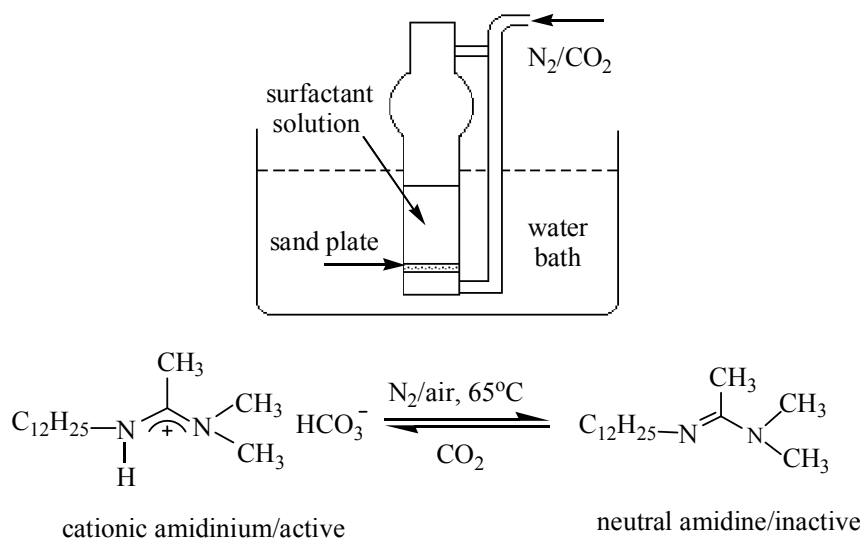


Figure S4. Illustration of inter-conversion between surface-active form (cationic amidinium) and surface-inactive form (neutral amidine) of *N'*-dodecyl-*N,N*-dimethylacetamidinium bicarbonate in a glass bubbling device at controlled temperatures by bubbling with N_2 and CO_2 respectively.⁴¹

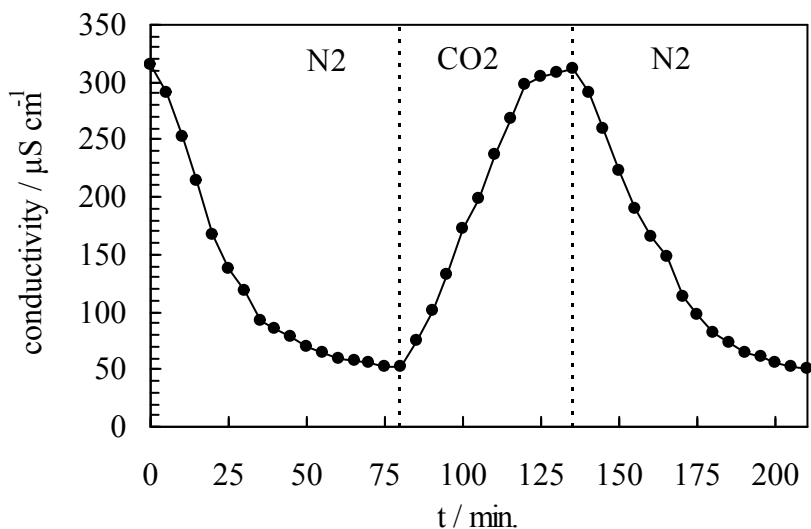


Figure S5. Conductivity variation of *N*-dodecyl-*N,N*-dimethylacetamidinium bicarbonate aqueous solution (1 mM) upon bubbling with N_2 at 65 °C and CO_2 at 0-5 °C respectively at a flow rate of 160 mL/min.⁴¹ For conductivity measurements the bubbling device containing the sample was removed from the water/ice bath for around 1 min. (the temperature is then close to room temperature, *ca.* 20 °C). The exact conductivities of the solution at 65 °C/0-5 °C just before bubbling N_2 and after bubbling N_2 for 80 min. (just before bubbling CO_2) are 352/286 $\mu\text{S cm}^{-1}$ and 63/50 $\mu\text{S cm}^{-1}$, respectively.

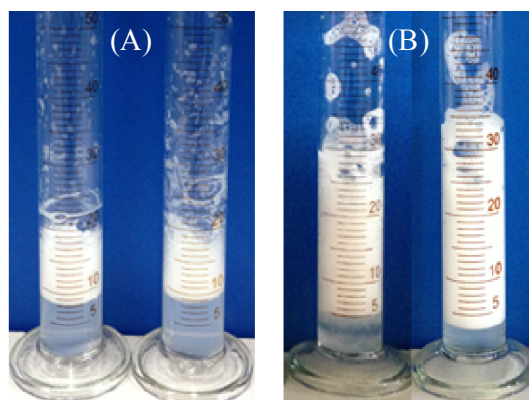


Figure S6. Photographs of foams stabilized by 0.5 wt.% silica nanoparticles in combination with either 0.3 mM *N*-dodecyl-*N,N*-dimethylacetamidinium bicarbonate (A) kept at 25 °C (left) and 65 °C for 80 min. (right) without bubbling with N₂, or 0.3 mM CTAB (B) kept at 25 °C (left) and by bubbling with N₂ (160 mL/min.) at 65 °C for 80 min. (right).