S1 DSC thermograms of immersion freezing experiments with emulsions of freshly prepared sanidine suspensions in water or aqueous solutions

We show one set of DSC thermograms (1 K min^{-1} cooling cycle) for the freshly prepared emulsions containing each solute concentration once.

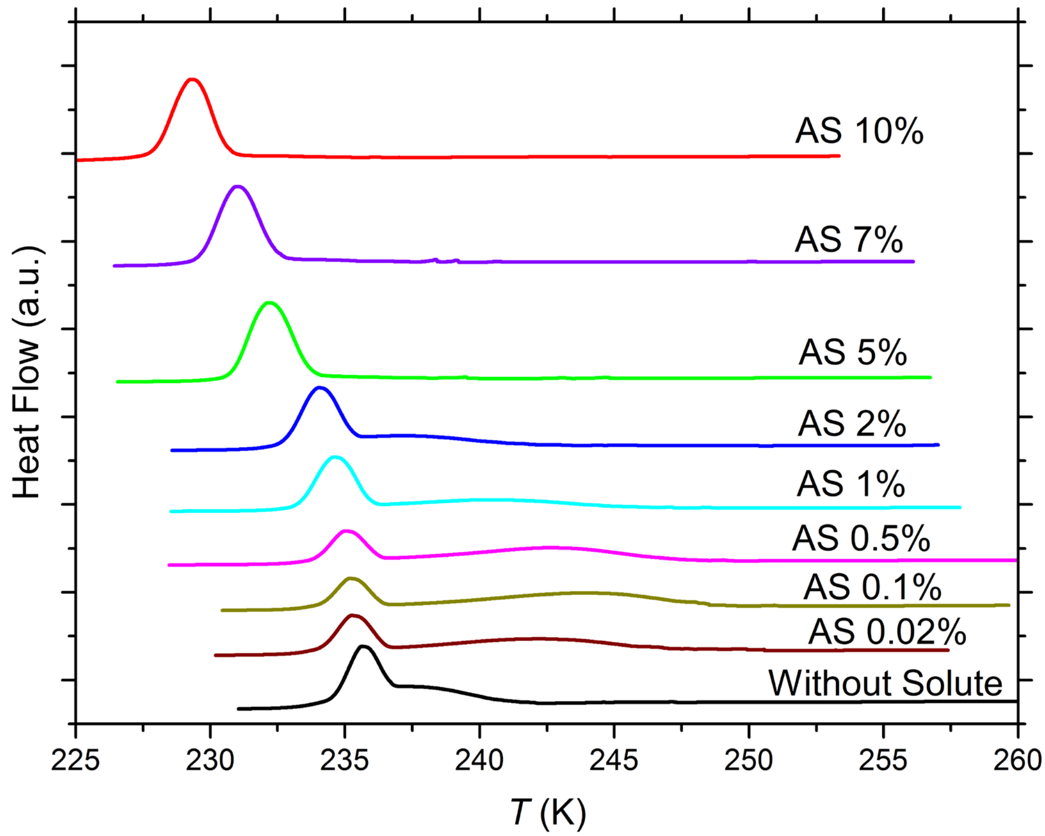

Figure S1. DSC thermograms of 2 wt% sanidine particles suspended in ammonium sulfate (AS) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%.

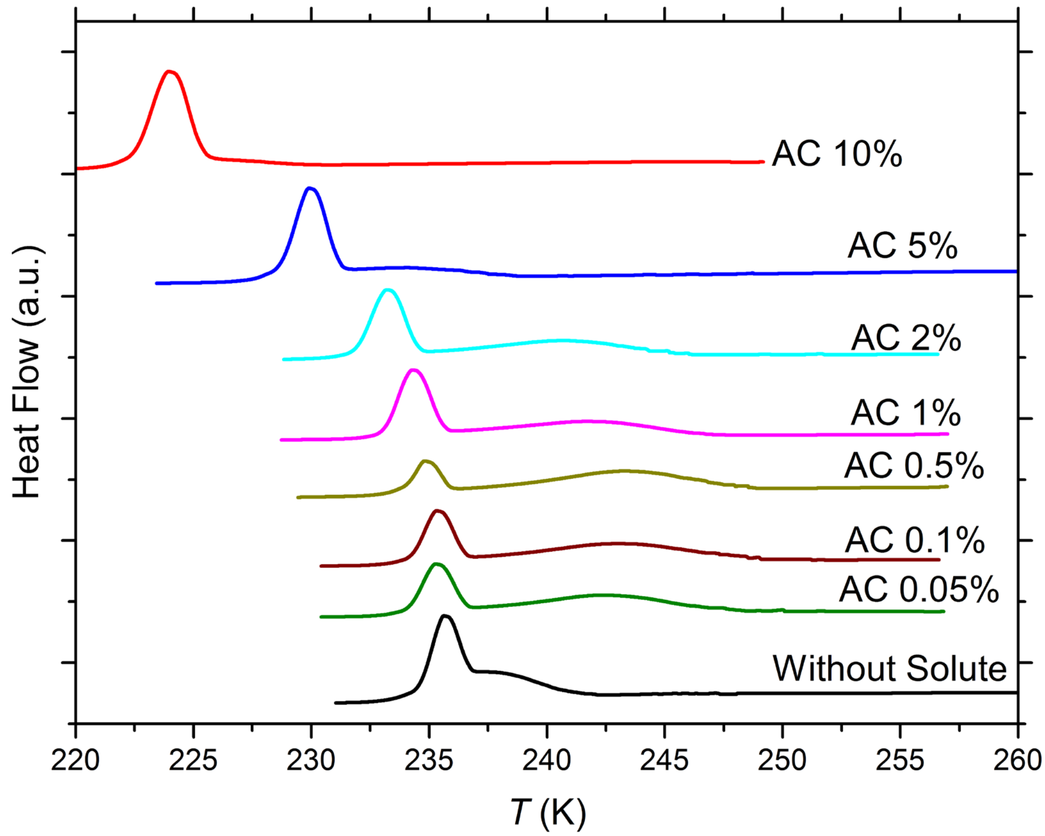

Figure S2. DSC thermograms of 2 wt% sanidine particles suspended in ammonium chloride (AC) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%.

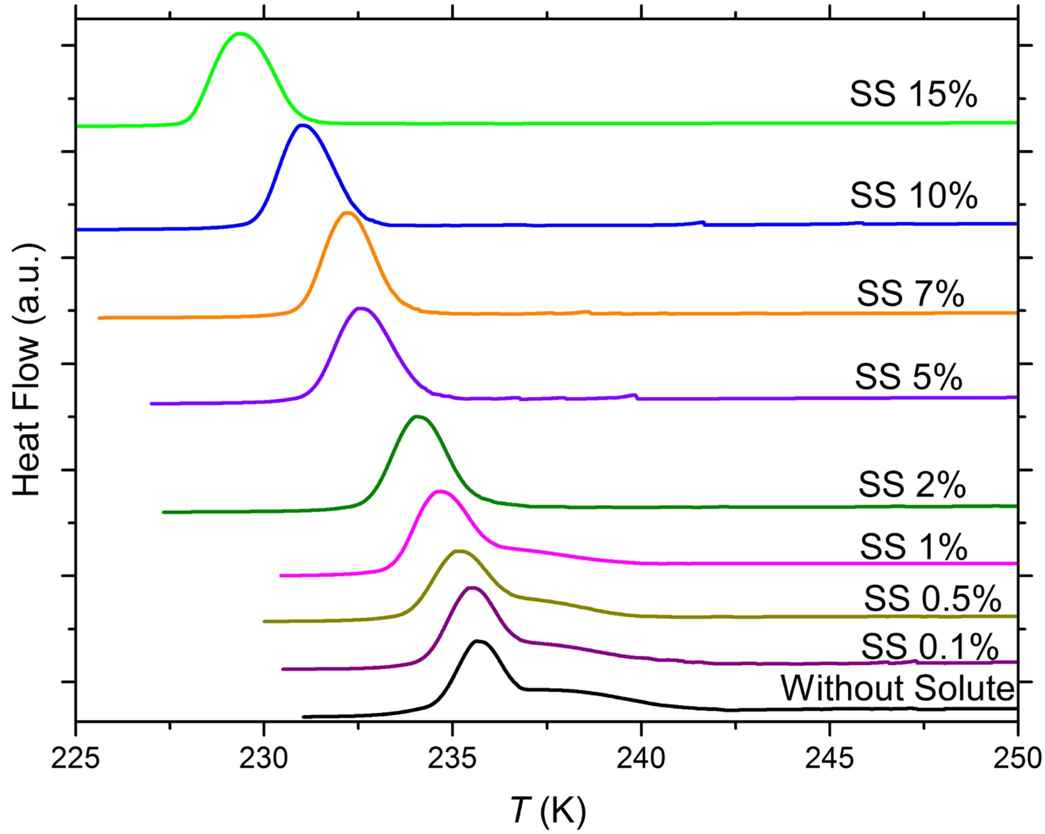

Figure S3. DSC thermograms of 2 wt% sanidine particles suspended in sodium sulfate (SS) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%.

S2 DSC thermograms of immersion freezing experiments with emulsions of freshly prepared andesine suspensions in water or aqueous solutions

We show one set of DSC thermograms (1 K min^{-1} cooling cycle) for the freshly prepared emulsions containing each solute concentration once.

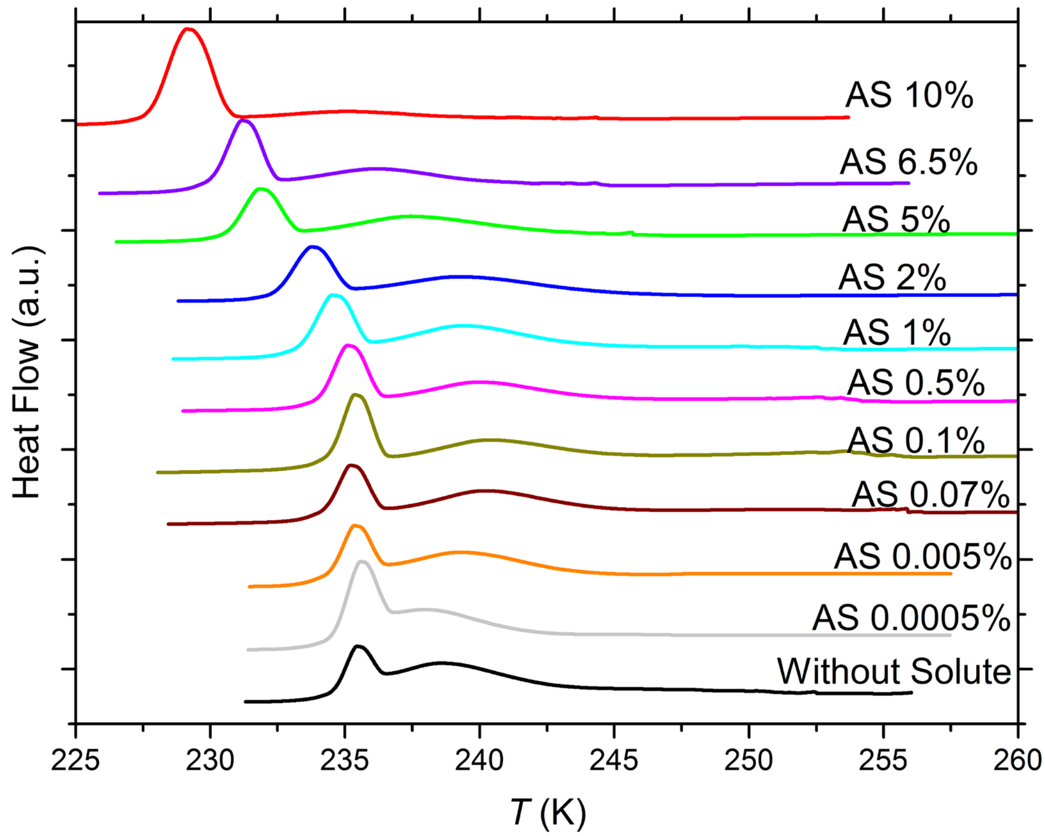

Figure S4. DSC thermograms of 2 wt% andesine particles suspended in ammonium sulfate (AS) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%).

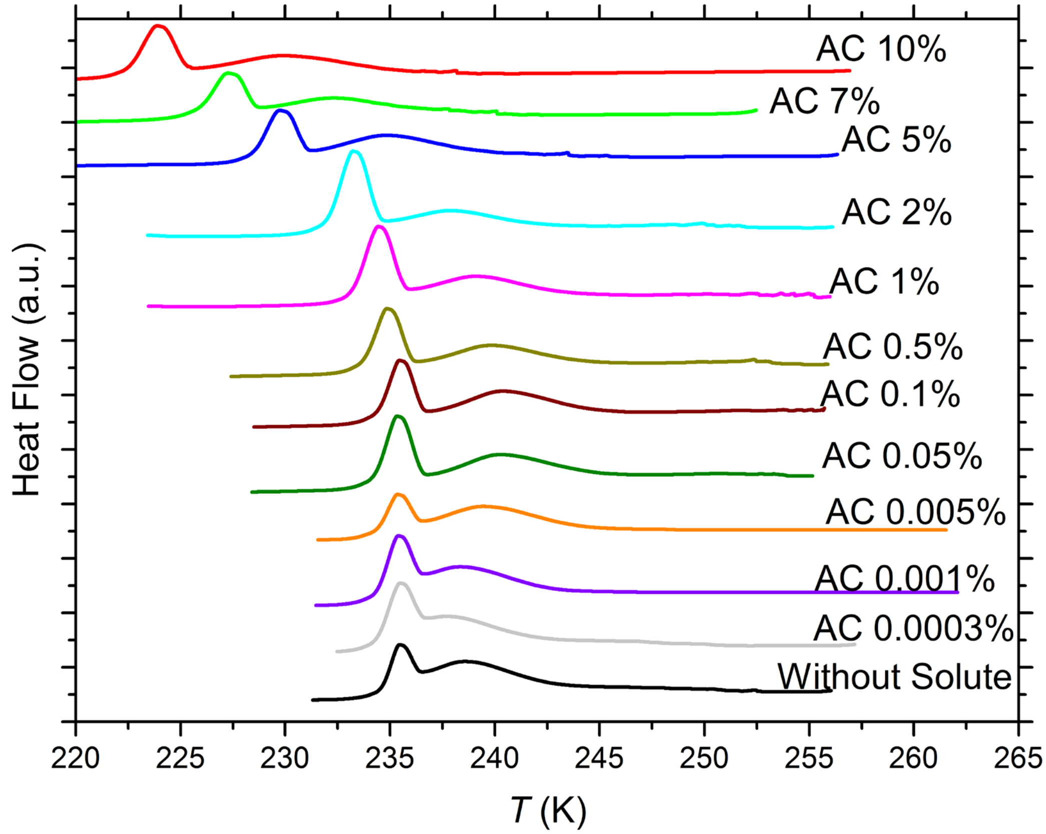

Figure S5. DSC thermograms of 2 wt% andesine particles suspended in ammonium chloride (AC) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%.

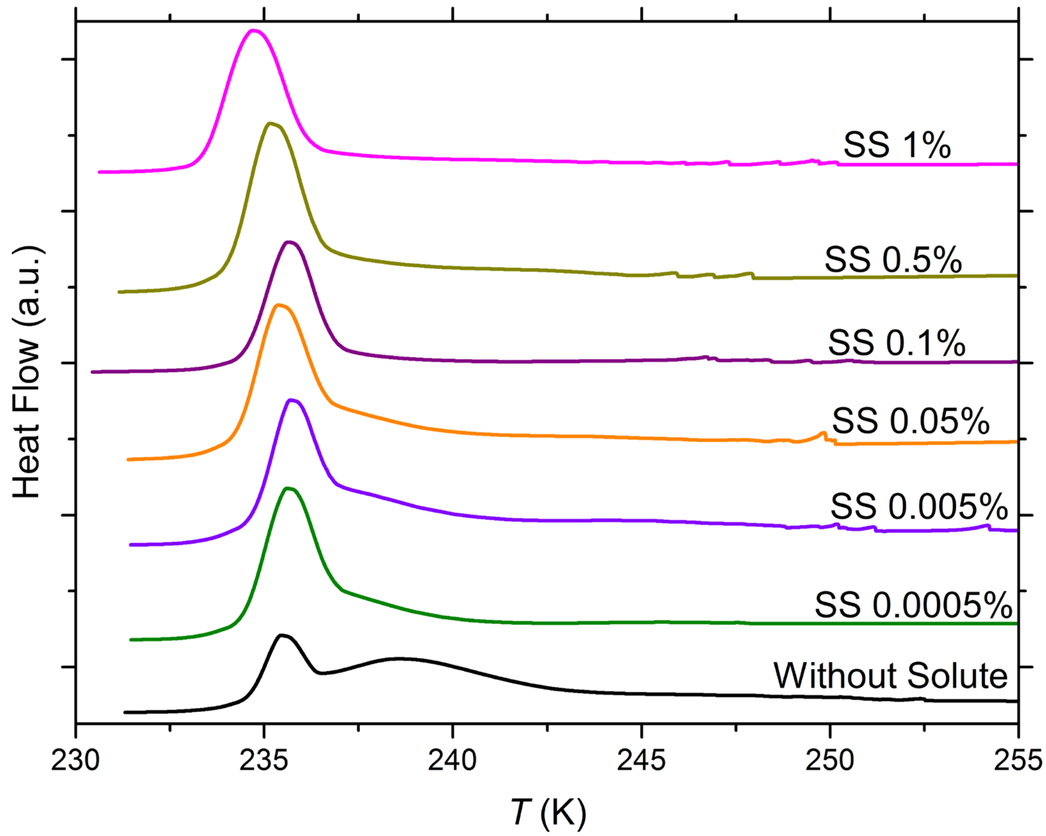

Figure S6. DSC thermograms of 2 wt% andesine particles suspended in sodium sulfate (SS) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%).

S3 DSC thermograms of immersion freezing experiments with emulsions of freshly prepared kaolinite suspensions in water or aqueous solutions

We show one set of DSC thermograms (1 K min^{-1} cooling cycle) for the freshly prepared emulsions containing each solute concentration once.

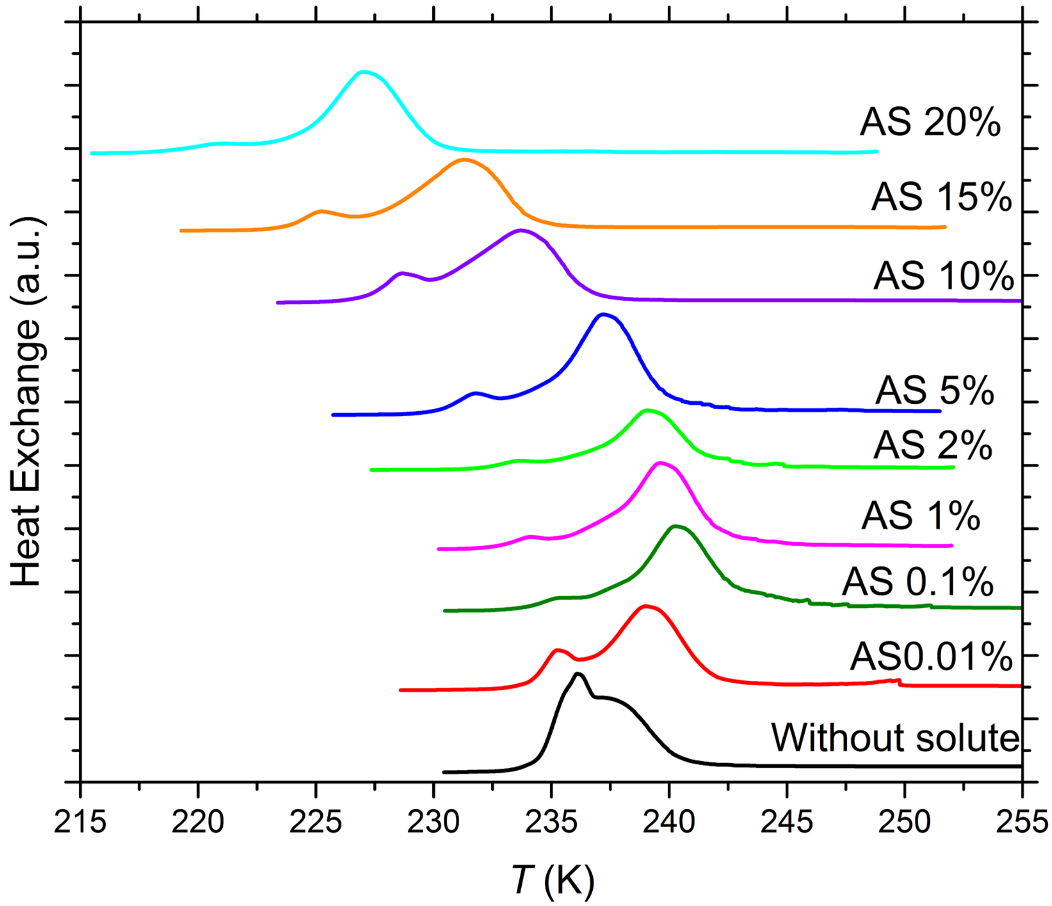

Figure S7. DSC thermograms of 2 wt% kaolinite particles suspended in ammonium sulfate (AS) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%.

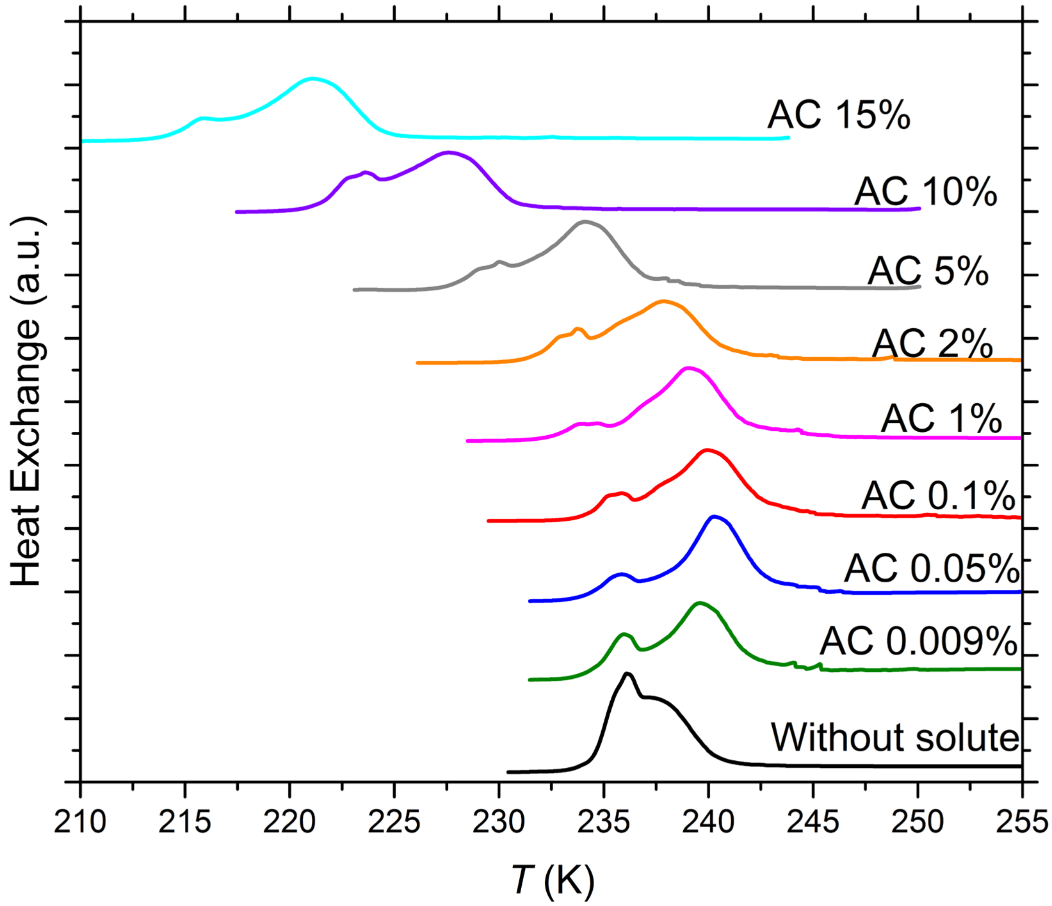

Figure S8. DSC thermograms of 2 wt% kaolinite particles suspended in ammonium chloride (AC) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%.

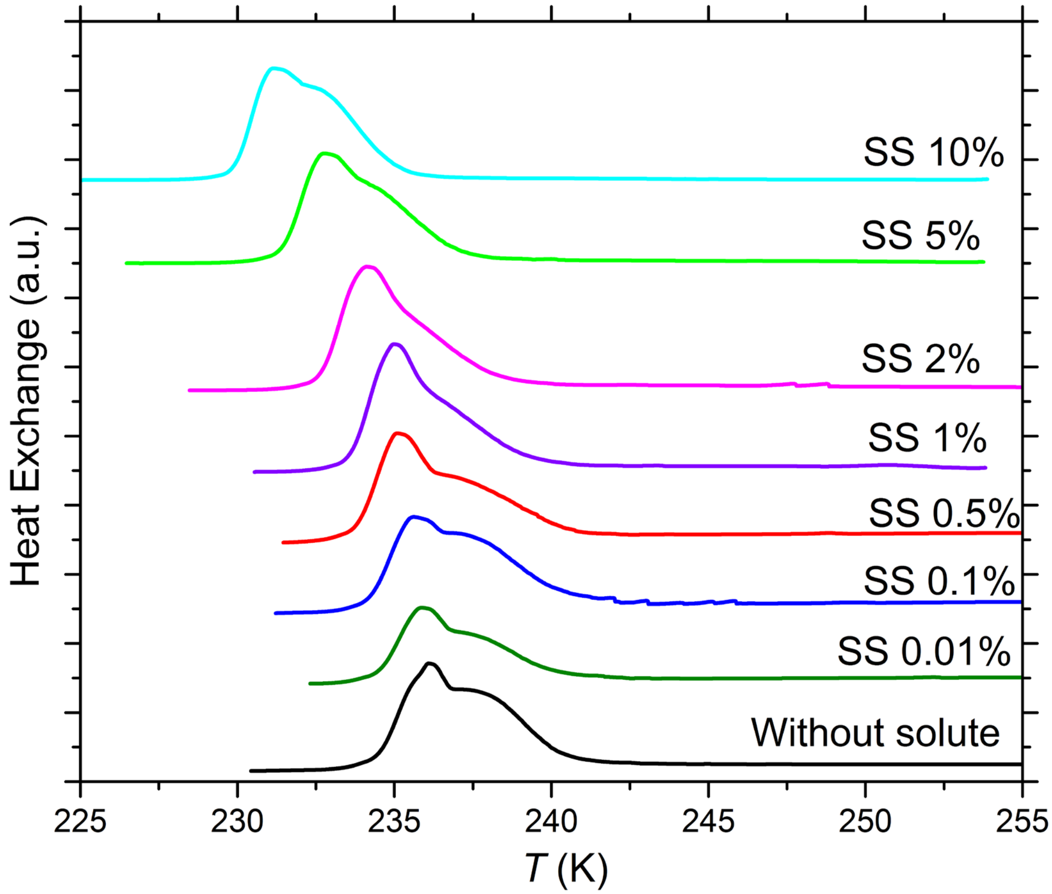

Figure S9. DSC thermograms of 2 wt% kaolinite particles suspended in sodium sulfate (SS) solution droplets of varying concentration. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value. Numbers next to each curve: Solute concentration in wt%.

S4 DSC thermograms of immersion freezing experiments with emulsions of kaolinite suspensions in water or aqueous solutions aged over a period of 5 days

Two sets of suspensions prepared with kaolinite (5 wt%) in pure water, ammonia solution (0.005 molal), and ammonium sulfate solutions (0.1 wt% and 10 wt%) were aged over a period of 5 days. Immersion freezing experiments were carried out with the DSC setup on the day of preparation (fresh), then on 5 subsequent days after preparation in order to assess the long-term effect of ammonia and ammonium containing solutes on the IN efficiency of kaolinite. We show one set of DSC thermograms (1 K min^{-1} cooling cycle) containing each solute concentration once over the measured time period.

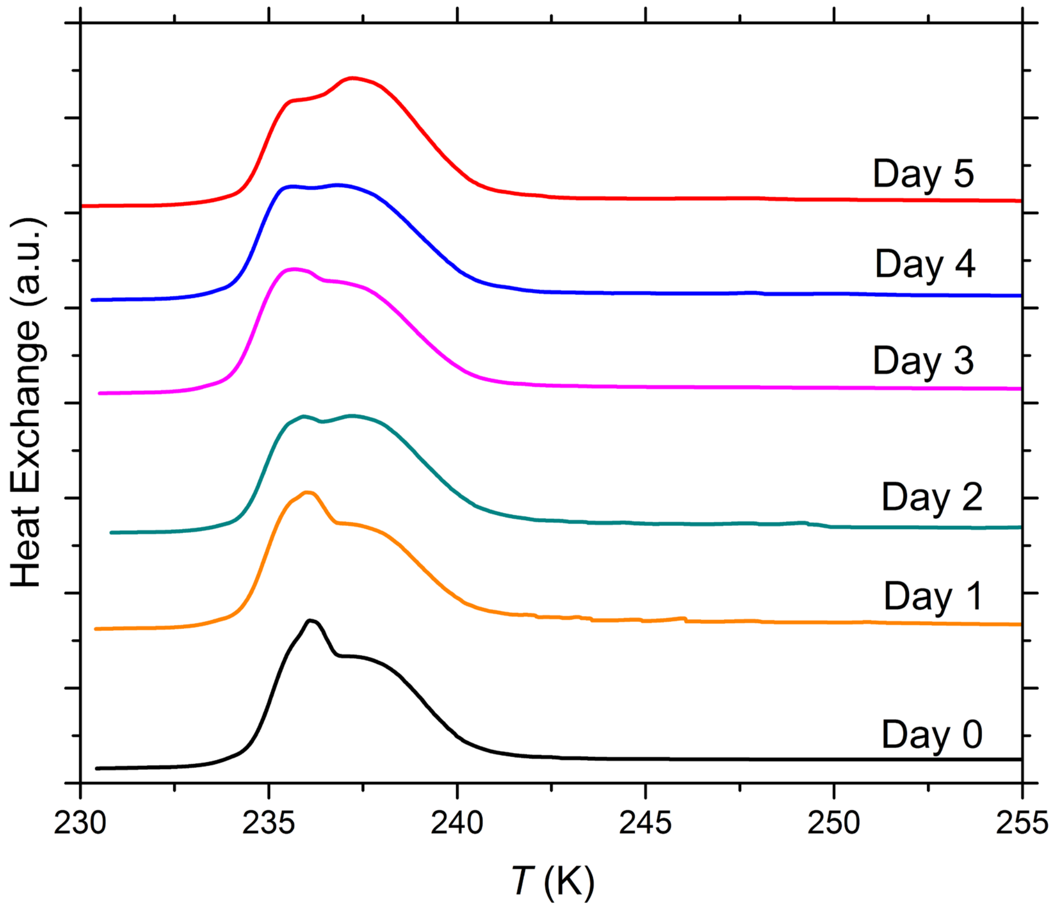

Figure S10. DSC thermograms of aging tests with 5 wt% kaolinite particles suspended in pure water droplets measured over a period of 5 days. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value.

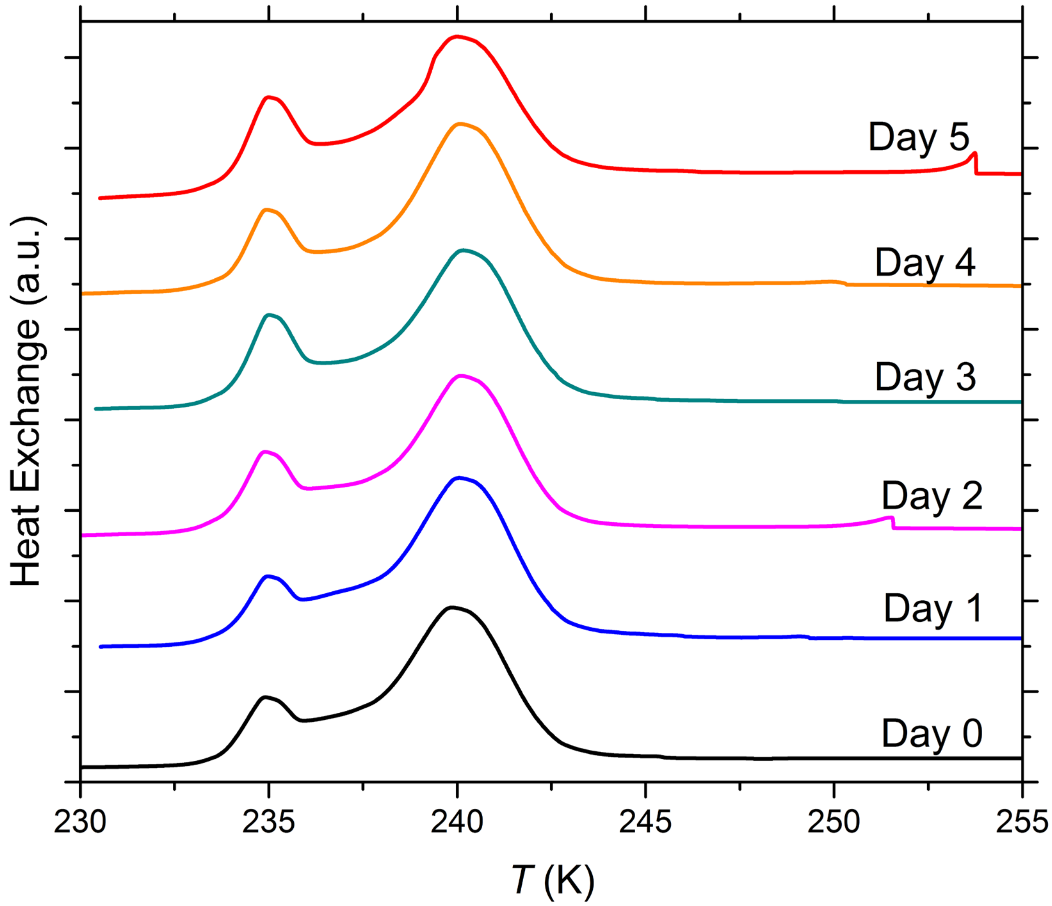

Figure S11. DSC thermograms of aging tests with 5 wt% kaolinite particles suspended in 0.005 molal ammonia solution droplets measured over a period of 5 days. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value.

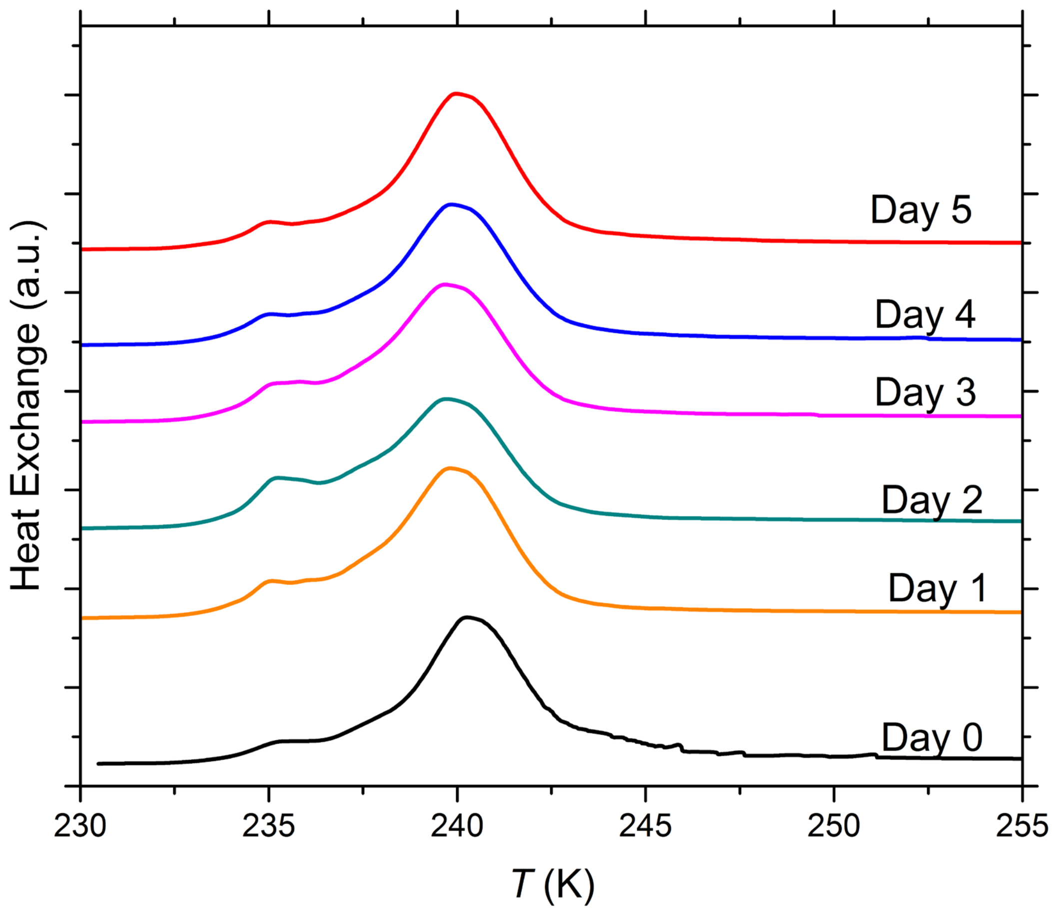

Figure S12. DSC thermograms of aging tests with 5 wt% kaolinite particles suspended in 0.1 wt% ammonium sulfate solution droplets measured over a period of 5 days. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value.

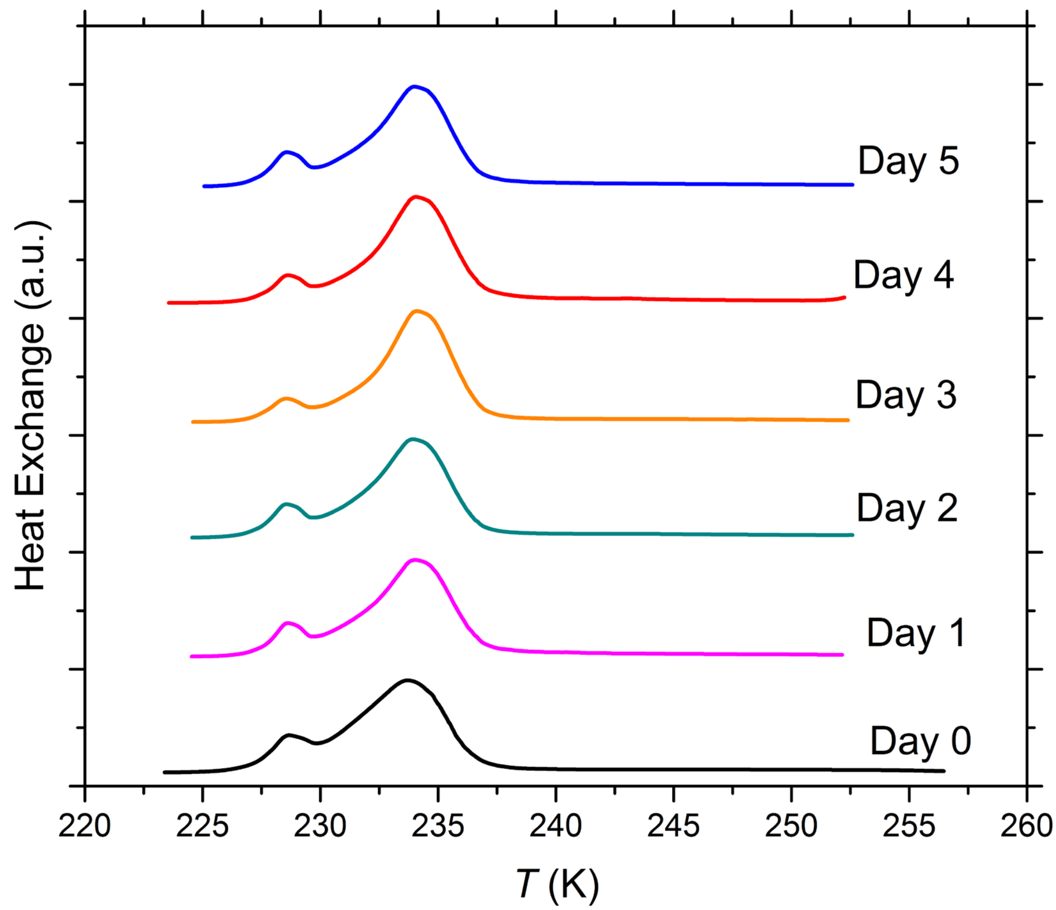

Figure S13. DSC thermograms of aging tests with 5 wt% kaolinite particles suspended in 10 wt% ammonium sulfate solution droplets measured over a period of 5 days. All curves are normalized such that the areas under the heterogeneous and homogeneous freezing curves sum up to the same value.

S5 Particle size distribution of biotite

The number size distribution of biotite sample was obtained with a TSI 3080 scanning mobility particle sizer (SMPS) and a TSI 3321 aerodynamic particle sizer (APS). The dry particles were dispersed using a fluidized bed. The sample shows a bimodal particle size distribution with mode diameters of 241 nm and 1.7 µm.

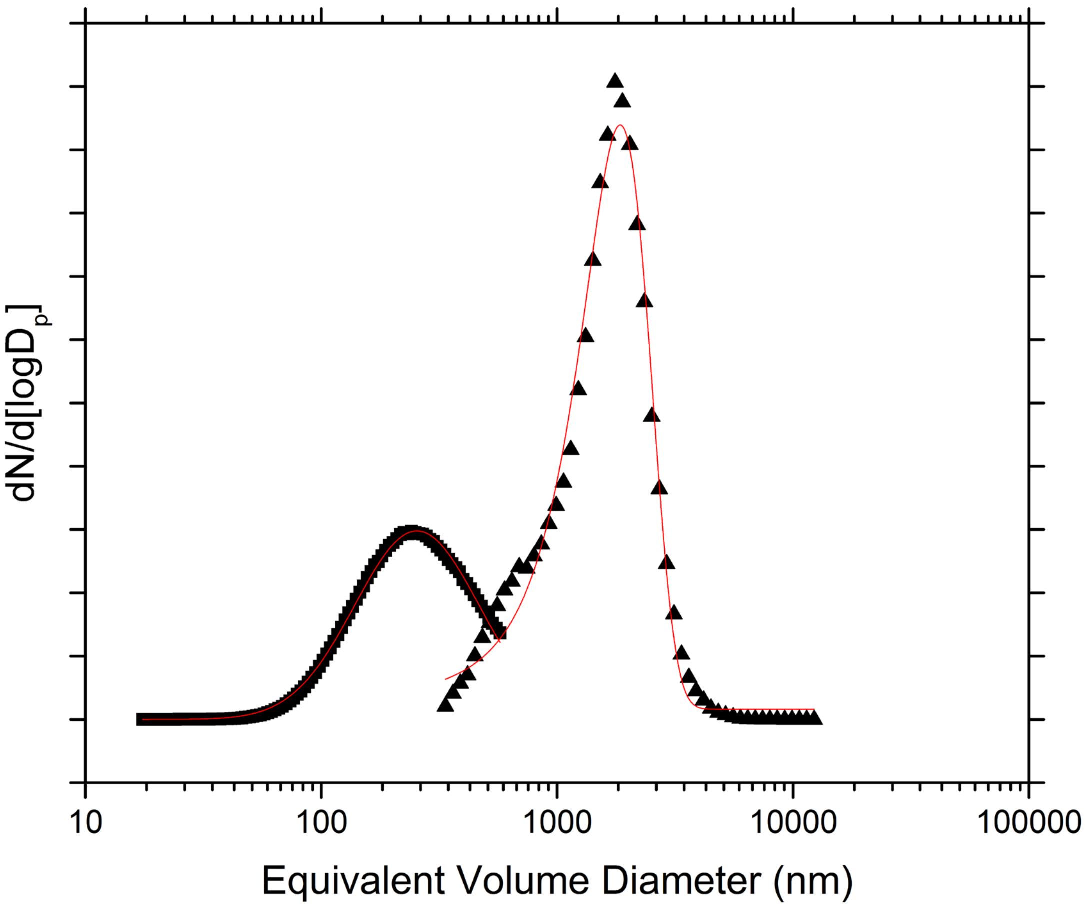

Figure S14. Particle size distribution for the biotite sample. Solid squares: SMPS; solid triangles: APS; red line: separate lognormal fit to datasets obtained from individual instruments.

S6 DSC thermograms of immersion freezing experiments with emulsions of microcline suspended in pure water aged over a period of 6 months

Microcline (2 wt%) suspended freshly in pure water in borosilicate glass vial was measured using DSC via emulsion freezing experiment. Then the suspension was re-measured after aging for 6 months to assess the effect of long term aging on its IN efficiency. Observed T_{het} and F_{het} for the fresh and aged sample are within the maximum uncertainty of both parameters, implying absence of any strong effect of 6 months aging.

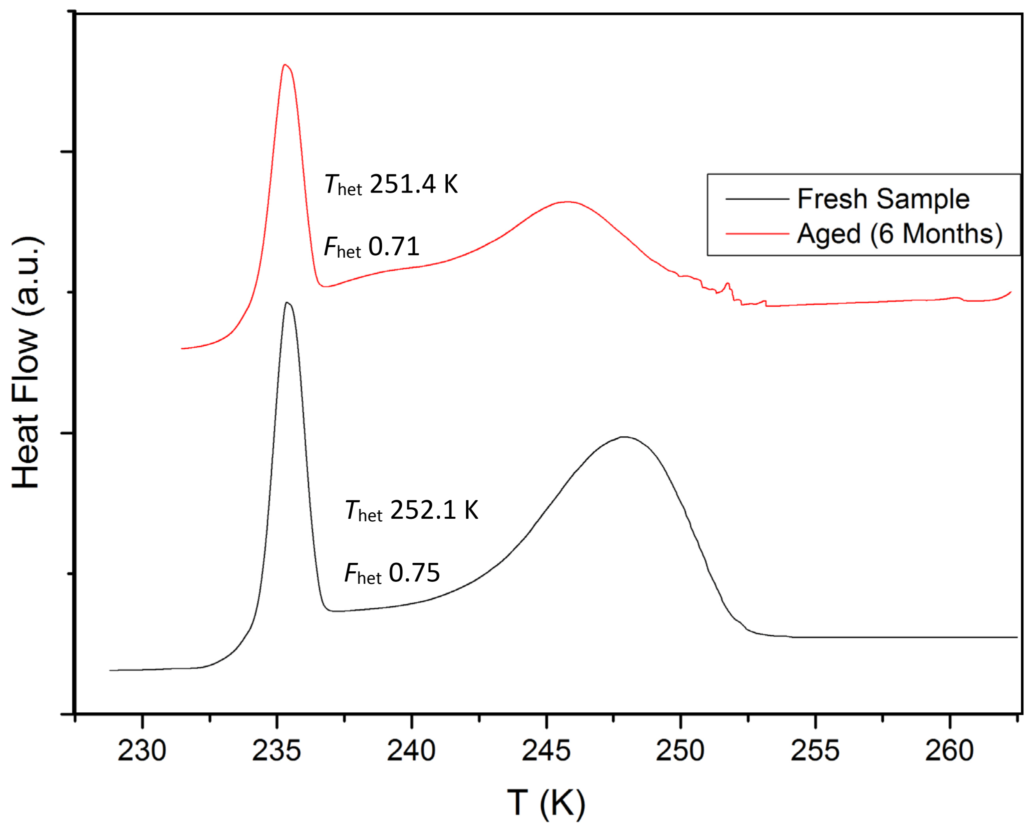

Figure S15. DSC thermograms of aging tests with 2 wt% microcline particles suspended in pure water droplets and measured fresh and after aging for 6 months.