Surfactant foams doped with laponite: unusual behaviors induced by aging and confinement

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We report results on foams stabilized by surfactant (Sodium Dodecyl Sulfate) and containing clay particles (laponite). We have studied how these foams age with time (drainage and coarsening) and their rheological properties. Due to the doping with laponite, which provides an additional time evolution of the foaming fluid itself, unusual behaviors are observed: especially, drainage arrest and re-start and enhanced elasticity are observed as a function of time. These results can be interpreted in terms of both confinement of the laponite inside the foam liquid channels, and competition between the laponite aging and the one of the foam (controlled by its own physical parameters). By playing with these foam parameters and those of the bulk solution containing laponite, we can control the time evolution and these non-monotonous features. Qualitatively, it is found that time, laponite concentration and confinement have all the same effect, enhancing the jamming of the interstitial fluid inside the foam.