Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Rigidity percolation in foamy sands SYLVIE COHEN-ADDAD, REINHARD HOHLER, MARCEL KRZAN, MARIJO MARINIC, Universite de Marne-la-Vallee, BENJAMIN HERZHAFT, Institut Francais du Petrole — When subjected to a small shear stress, an aqueous foam behaves as a linear viscoelastic materials, whereas large applied shear stress triggers bubble rearrangement which causes the foam to flow as a viscous liquid. The elastic behavior arises from the surface tension of the gas-liquid interfaces. We study experimentally how the shear modulus and the yield stress of foam are modified if non colloidal solid particles of controlled size are dispersed in the sample. We show that even small amounts of non colloidal particles added to a foam can enhance the viscoelastic shear modulus by more than an order of magnitude. The yield stress is also increased, but to a smaller extent. The scaling of the elasticity enhancement with solid fraction qualitatively agrees with that predicted by an effective medium rigidity percolation model in the superelastic limit. To gain insight about the interactions between solid particles that are involved in the rigidity percolation, we study the dependence of the percolation threshold with particle to bubble size ratio.

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Date submitted: 11 Jan 2006 Electronic form version 1.4