Martin van Hecke

I. 'Core ideas of jamming'

Abstr 1: Disordered systems exhibit rich, and counter intuitive, mechanical properties. I will illustrate these in a widely studied simple model for the mechanics of disordered media: disordered packings of soft, viscous spheres. The first crucial observation is that if you deform such systems, their response is highly non-affine. The second crucial observation is that this non-affinity can lead to anomalous elastic and mechanical properties.

For more material see the following introduction to jamming (from the 2009 fundamental problems in stat mech summerschool): A.O.N. Siemens and M. van Hecke: Jamming: A Simple Introduction Physica A 389 4255 (2010)
and if you're hardcore see a full review: M. van Hecke: Jamming of Soft Particles: Geometry, Mechanics, Scaling and Isostaticity J. Phys. Cond. Matt. 22 033101 (2010)

II. 'Flow near Jamming'

Abstr 2. What about the flow of disordered media? Phenomenologically, we know that these materials often have a finite yield threshold, and that at large stresses, the rheology becomes nonlinear. We show experimentally how disorder, again, plays a crucial role, and that fluctuations become stronger if you shear slower. We then put these observations on firm footing combining jamming ideas with energy conservation and will find a simple scaling model for the rheology of disordered media, that appears to be consistent with recent flow experiments on foams, emulsions and soft colloidal suspensions.

There is not really any good material yet, except for a PRL that even friendly colleagues claim is too hard to read: B. P. Tighe, E. Woldhuis, J. J.C. Remmers, W. van Saarloos, and M. van Hecke Model for the Scaling of Stresses and Fluctuations in Flows near Jamming, Phys. Rev. Lett. 105 088303 (2010)