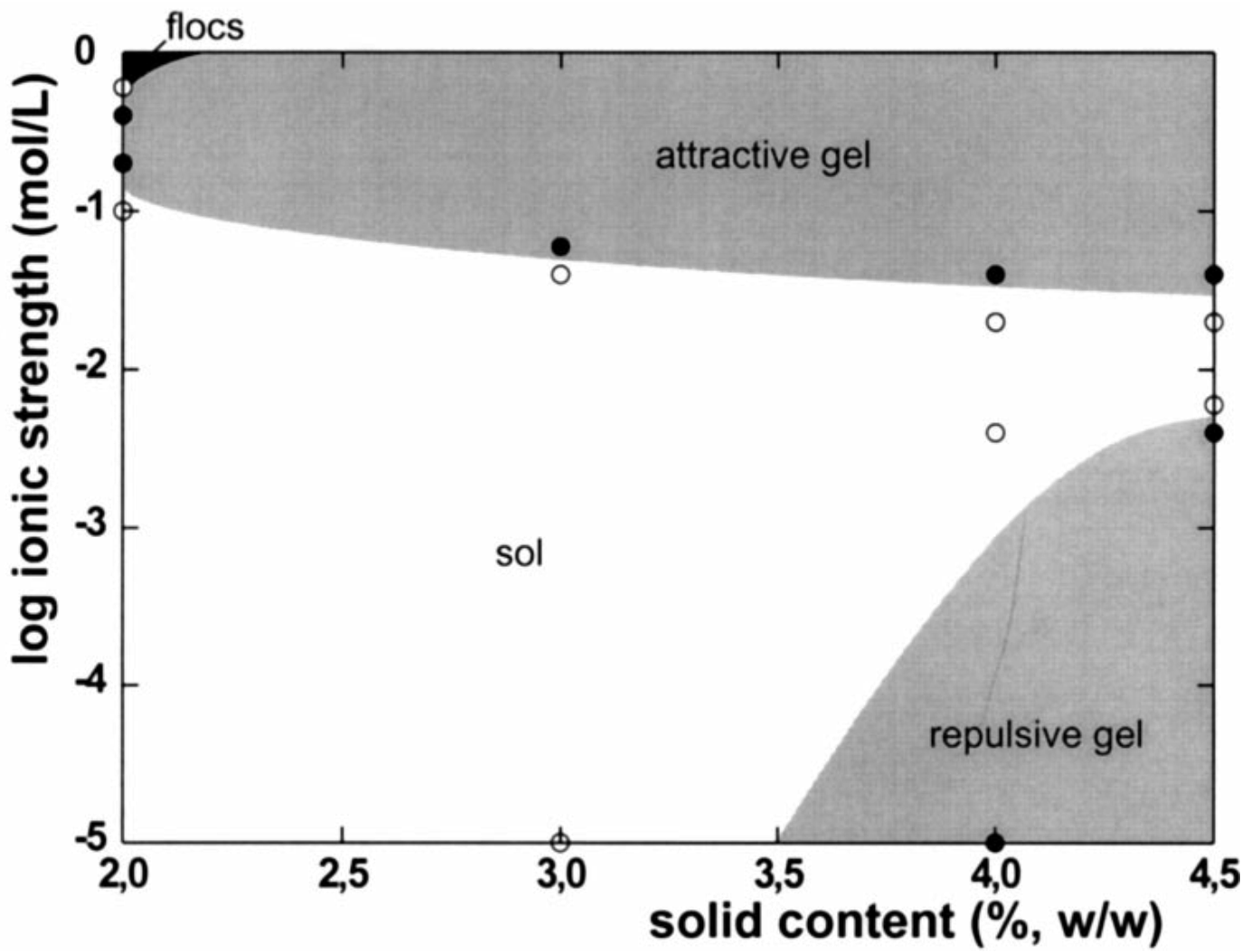


Montmorillonite rheology

Rasmus Eriksson

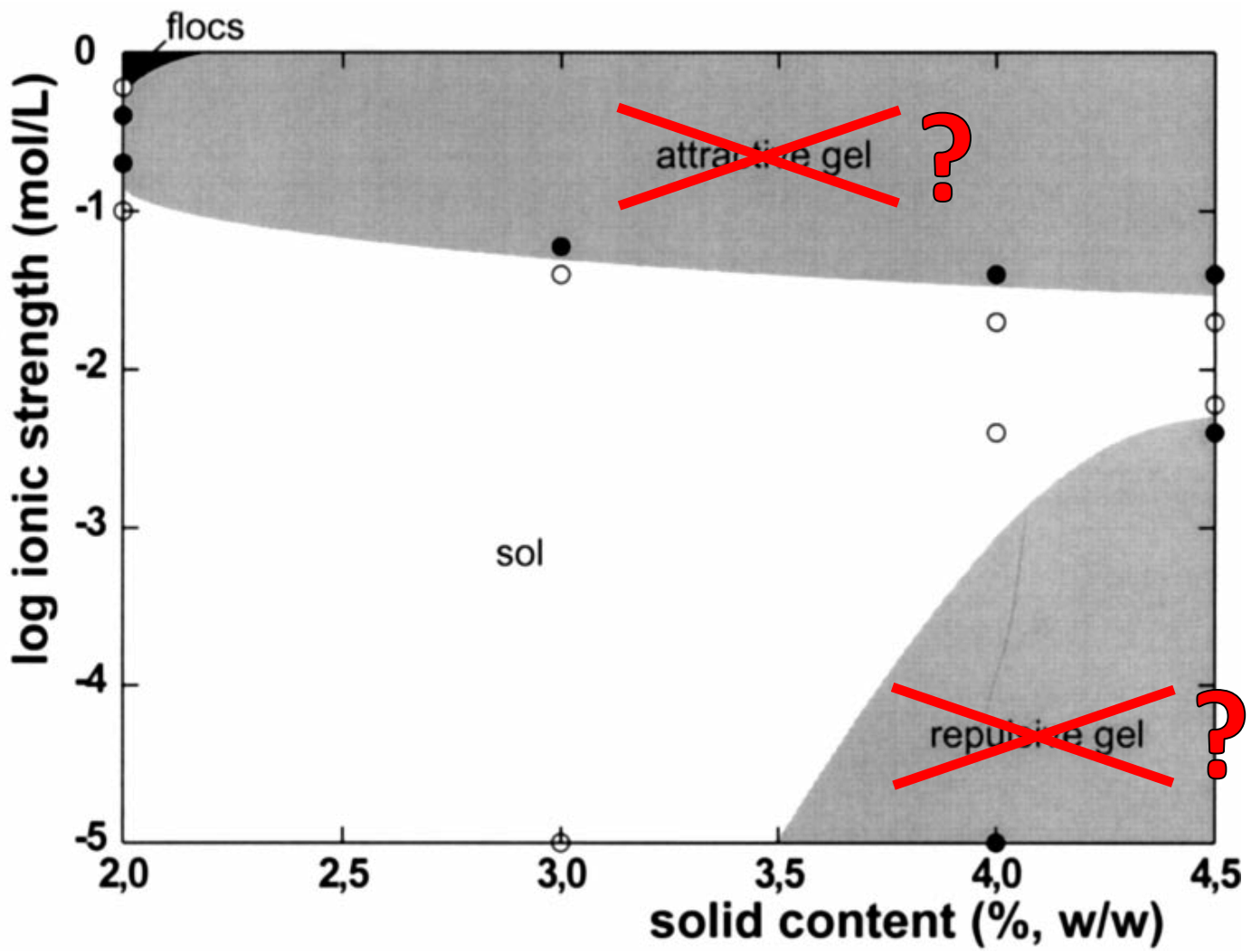
B+Tech Oy

Background



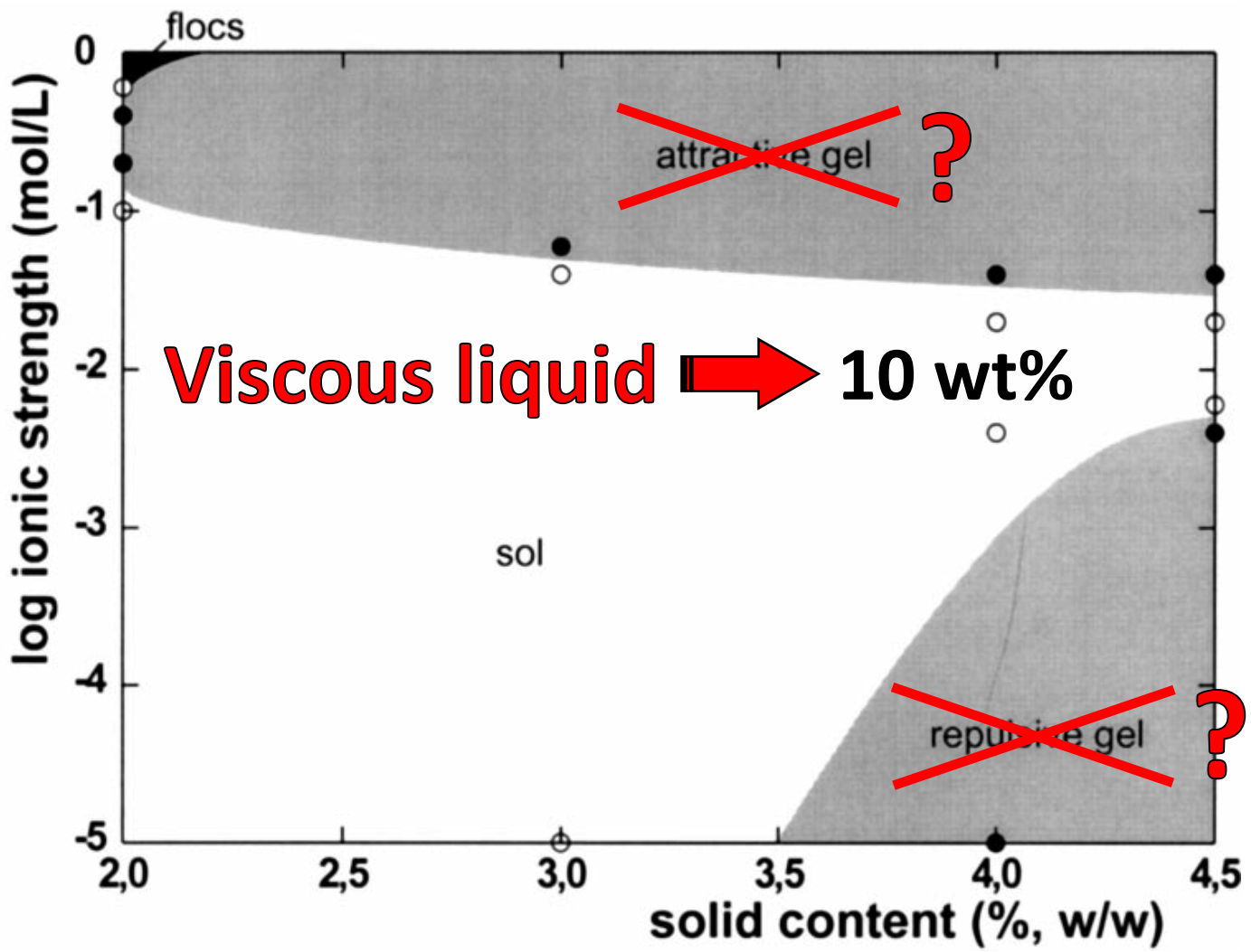
Abend and Lagaly, *Appl. Clay Sci.* **2000**, 16, 201.

Background



Abend and Lagaly, *Appl. Clay Sci.* **2000**, 16, 201.

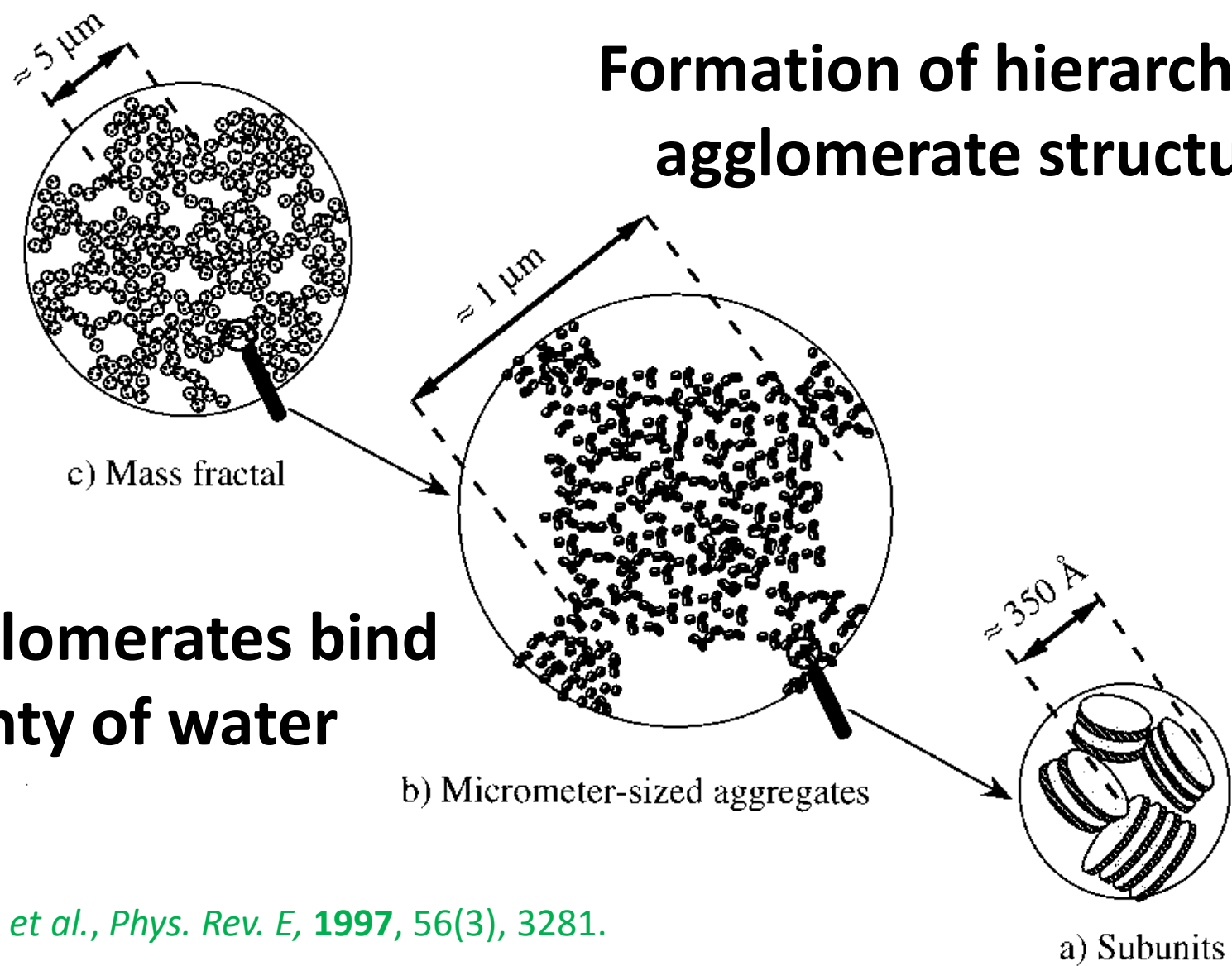
Background



Abend and Lagaly, *Appl. Clay Sci.* 2000, 16, 201.

Macroscopic structure (NaMt)

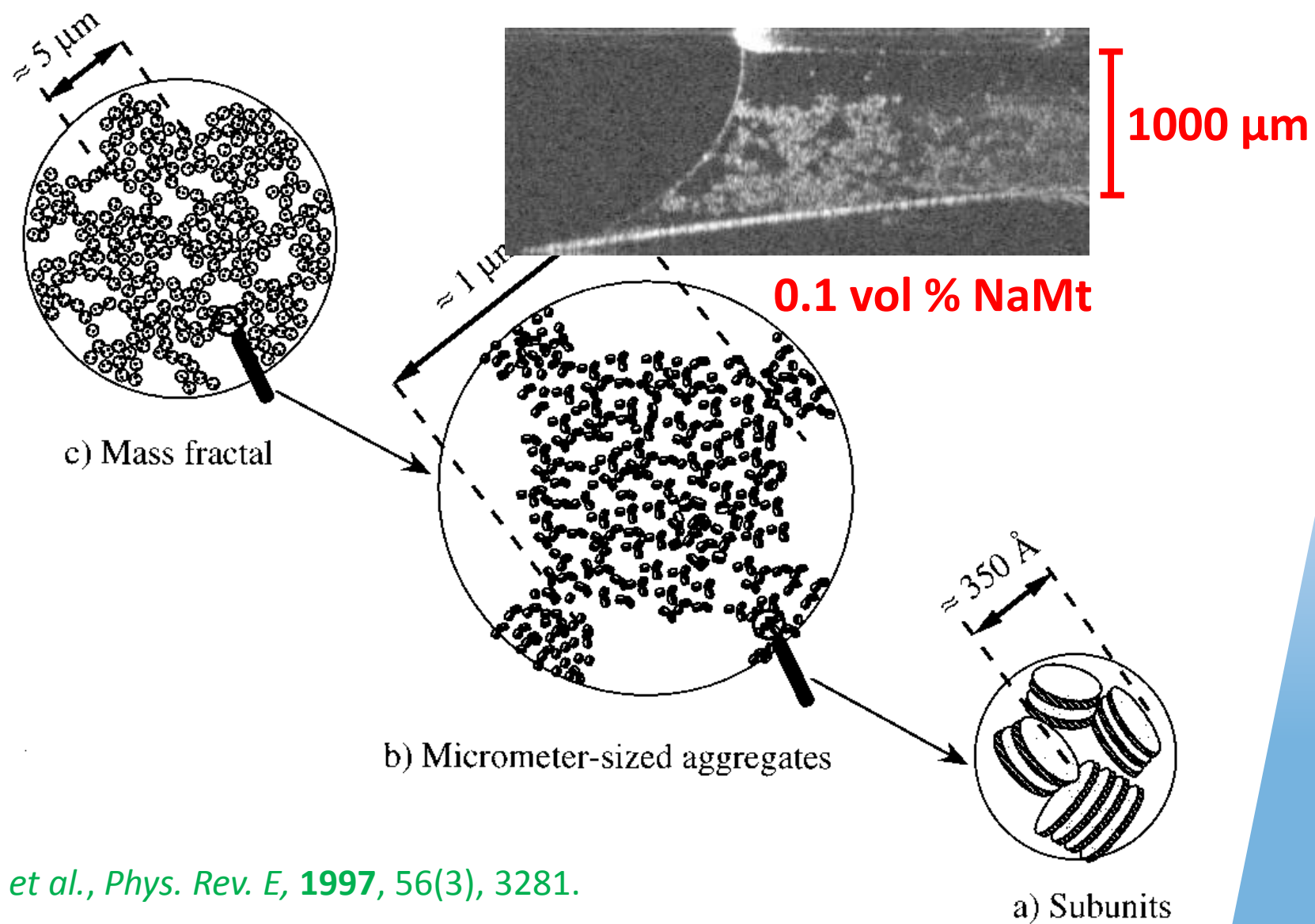
Formation of hierarchical agglomerate structures



Agglomerates bind plenty of water

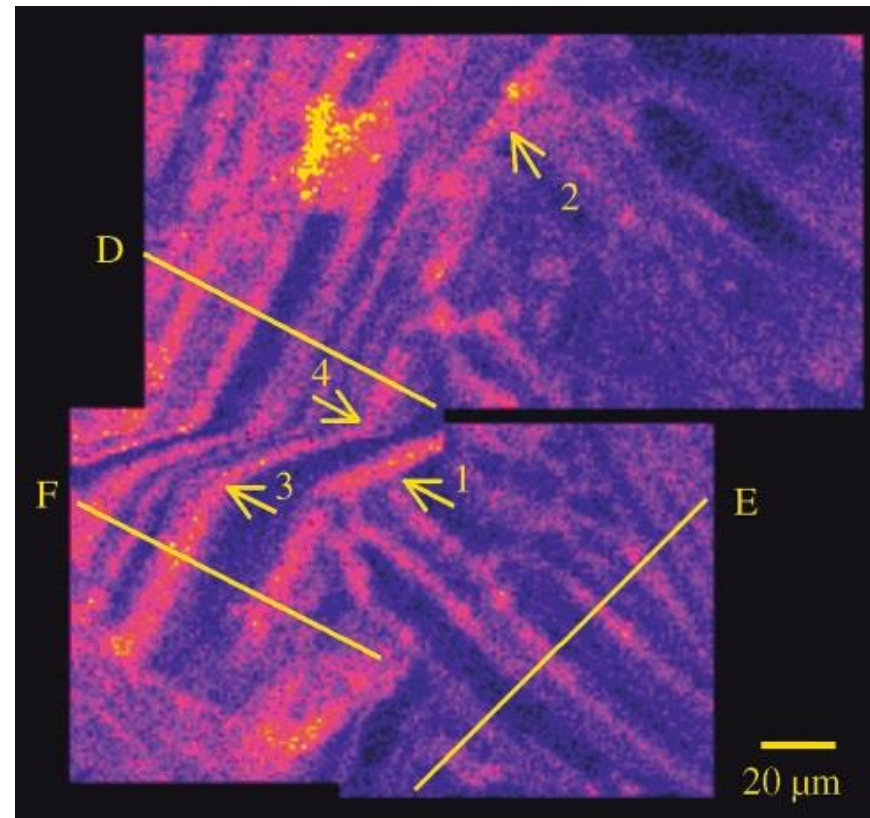
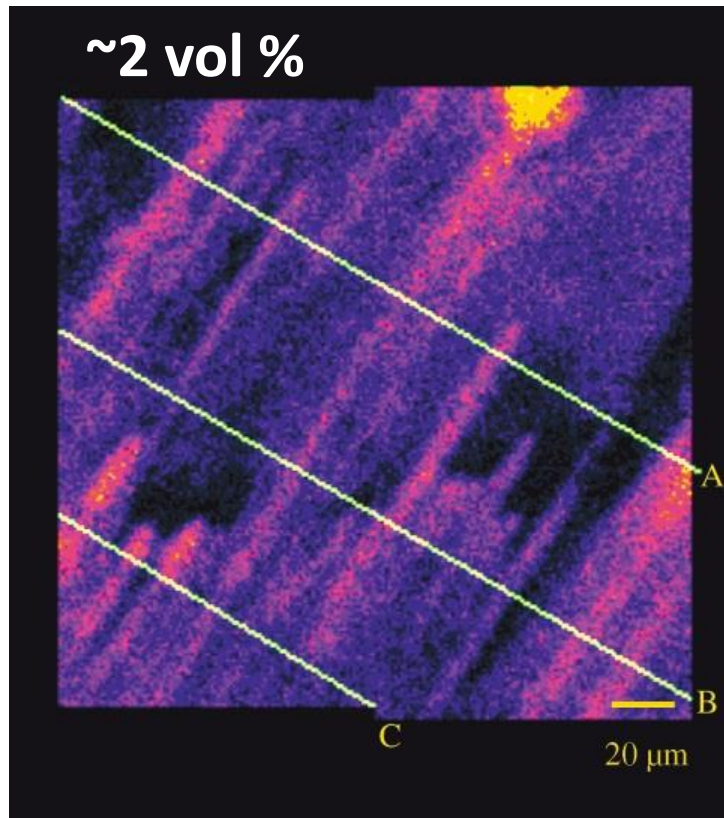
Pignon *et al.*, *Phys. Rev. E*, **1997**, 56(3), 3281.

Macroscopic structure (NaMt)



Pignon *et al.*, *Phys. Rev. E*, **1997**, 56(3), 3281.

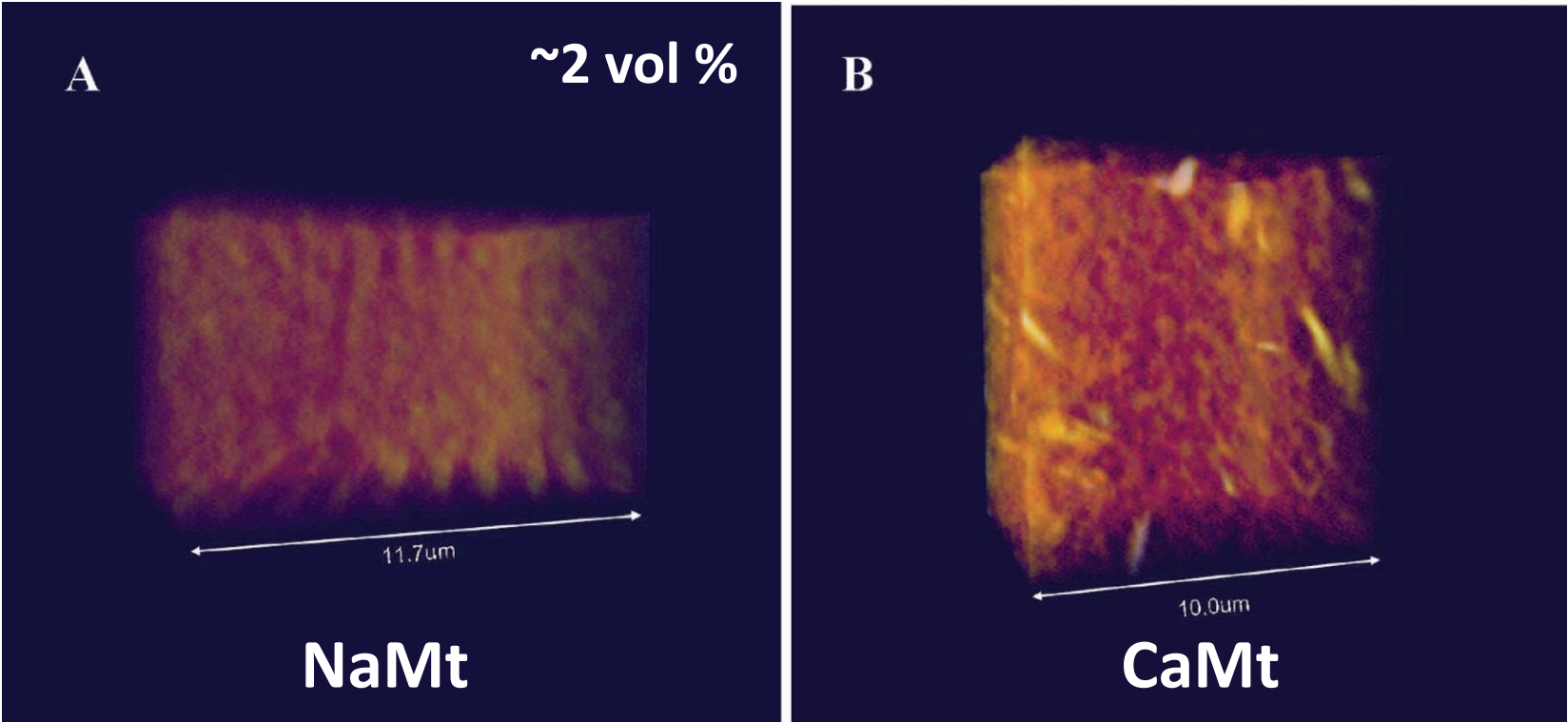
Macroscopic structure (NaMt)



TXM images reveal lamellar structure, and periodicities of $\sim 6 \mu\text{m}$ and $\sim 18 \mu\text{m}$.

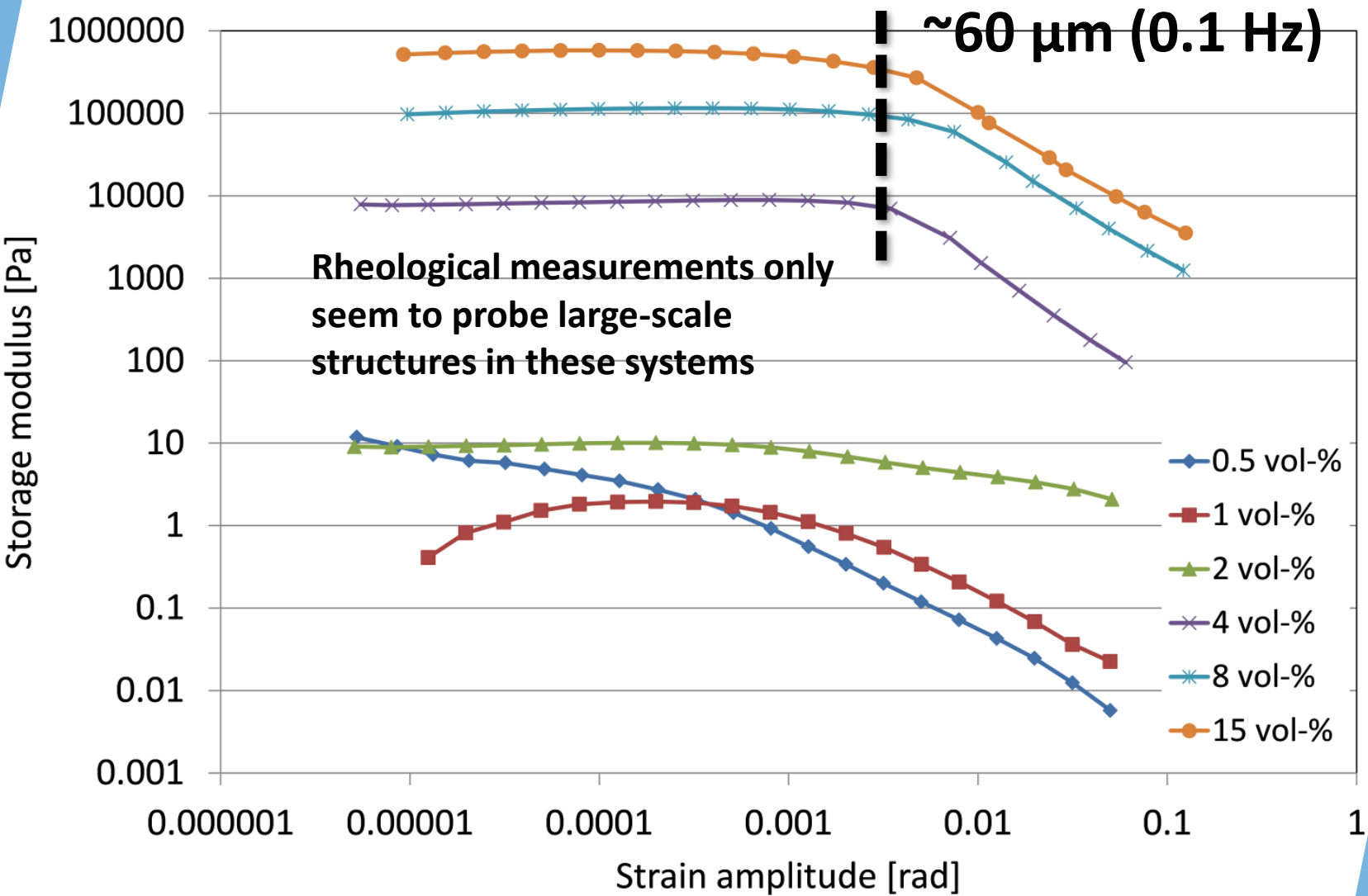
Bihannic et al., Langmuir, 2001, 17, 4144.

Macroscopic structure

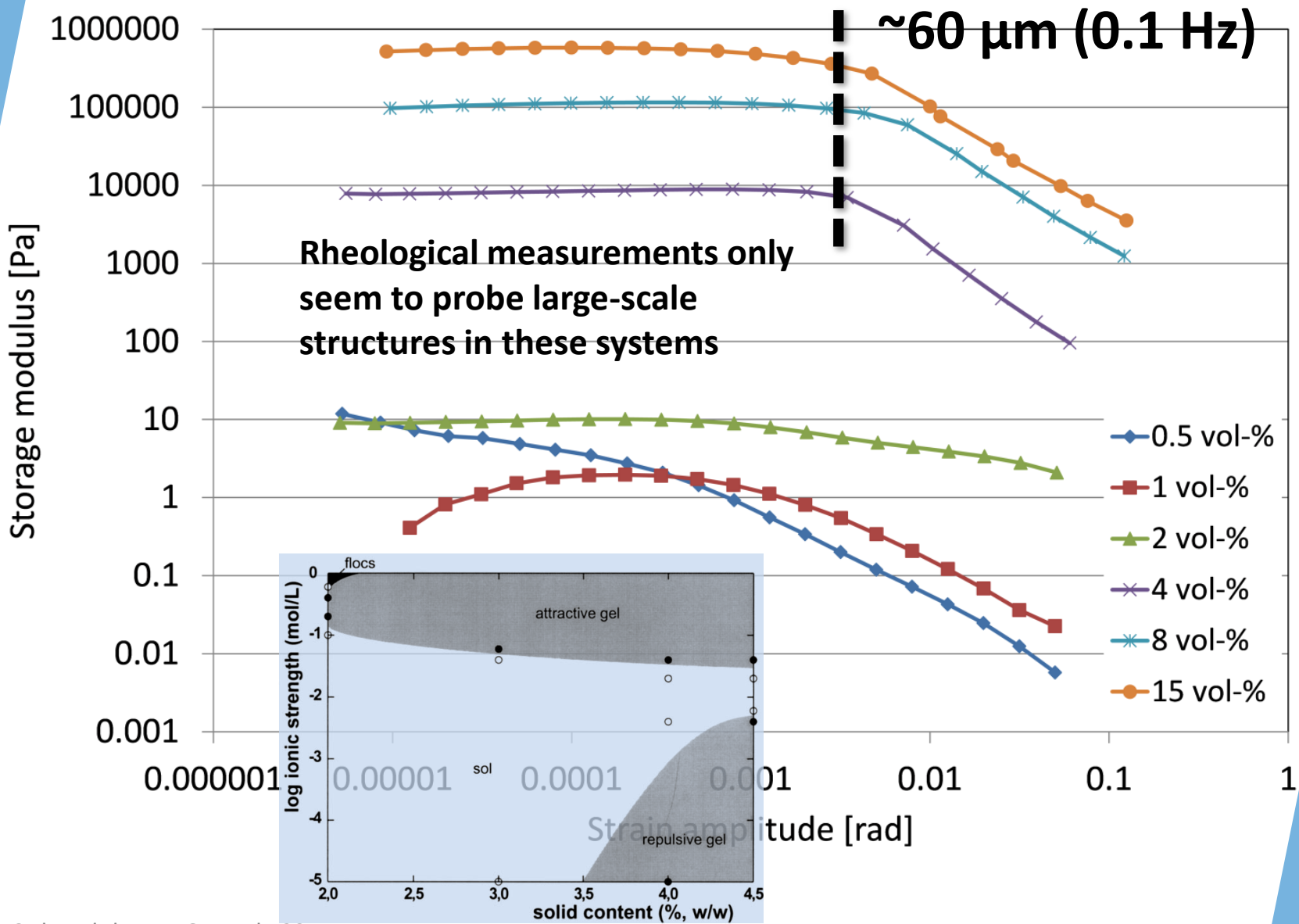


Zbik *et al.*, *Langmuir*, **2008**, 24, 8954.

50/50 Na/Ca-Mt, 1 mM NaCl

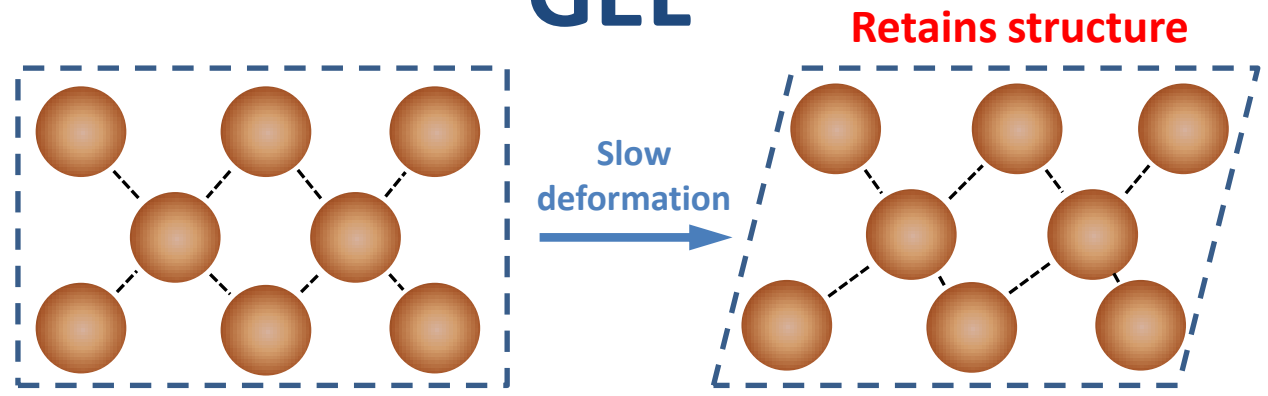


50/50 Na/Ca-Mt, 1 mM NaCl

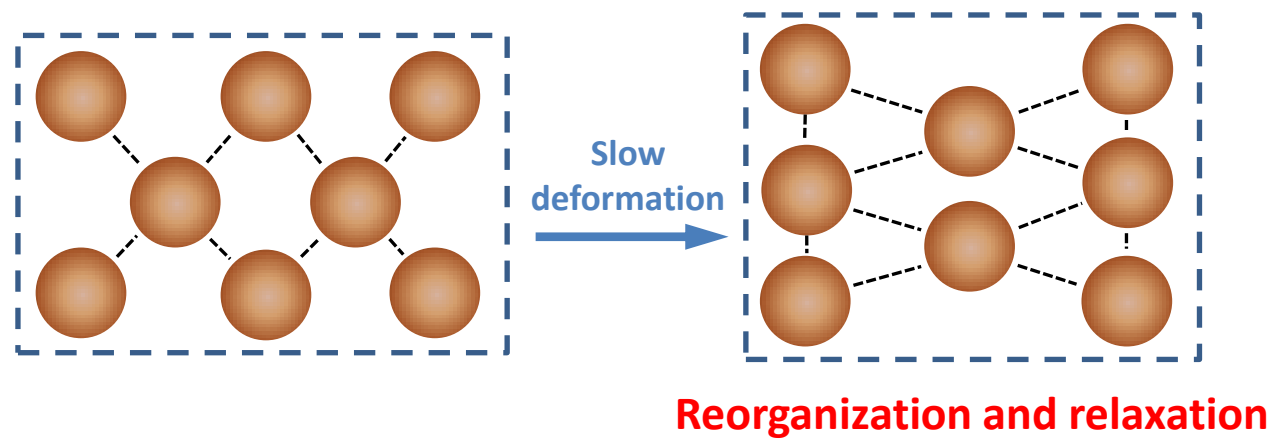


Response to small strain (rate)

GEL

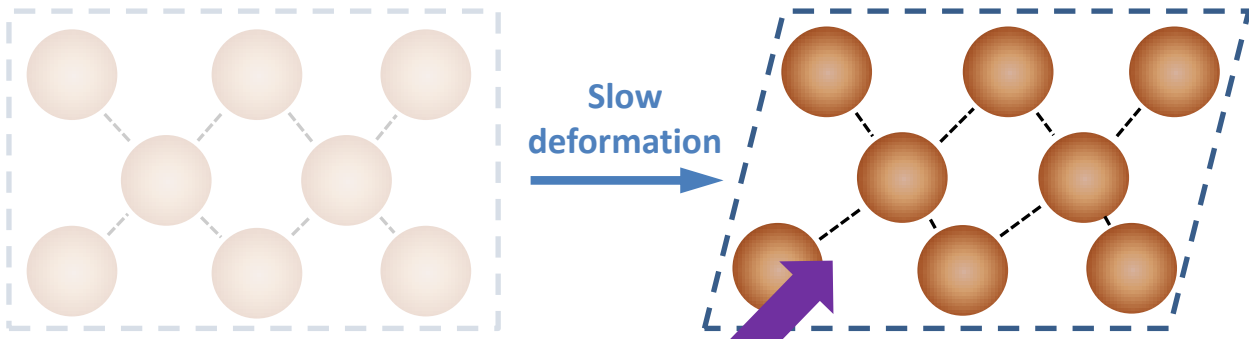


VISCOELASTIC FLUID



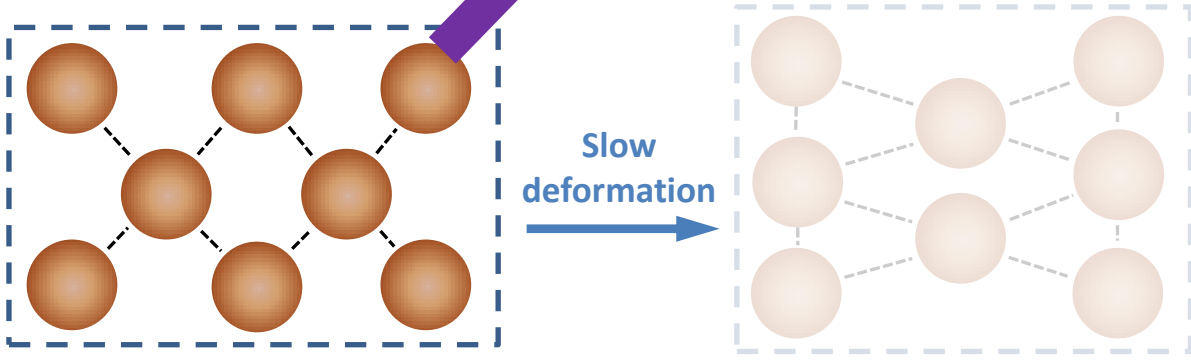
Response to small strain (rate)

GEL



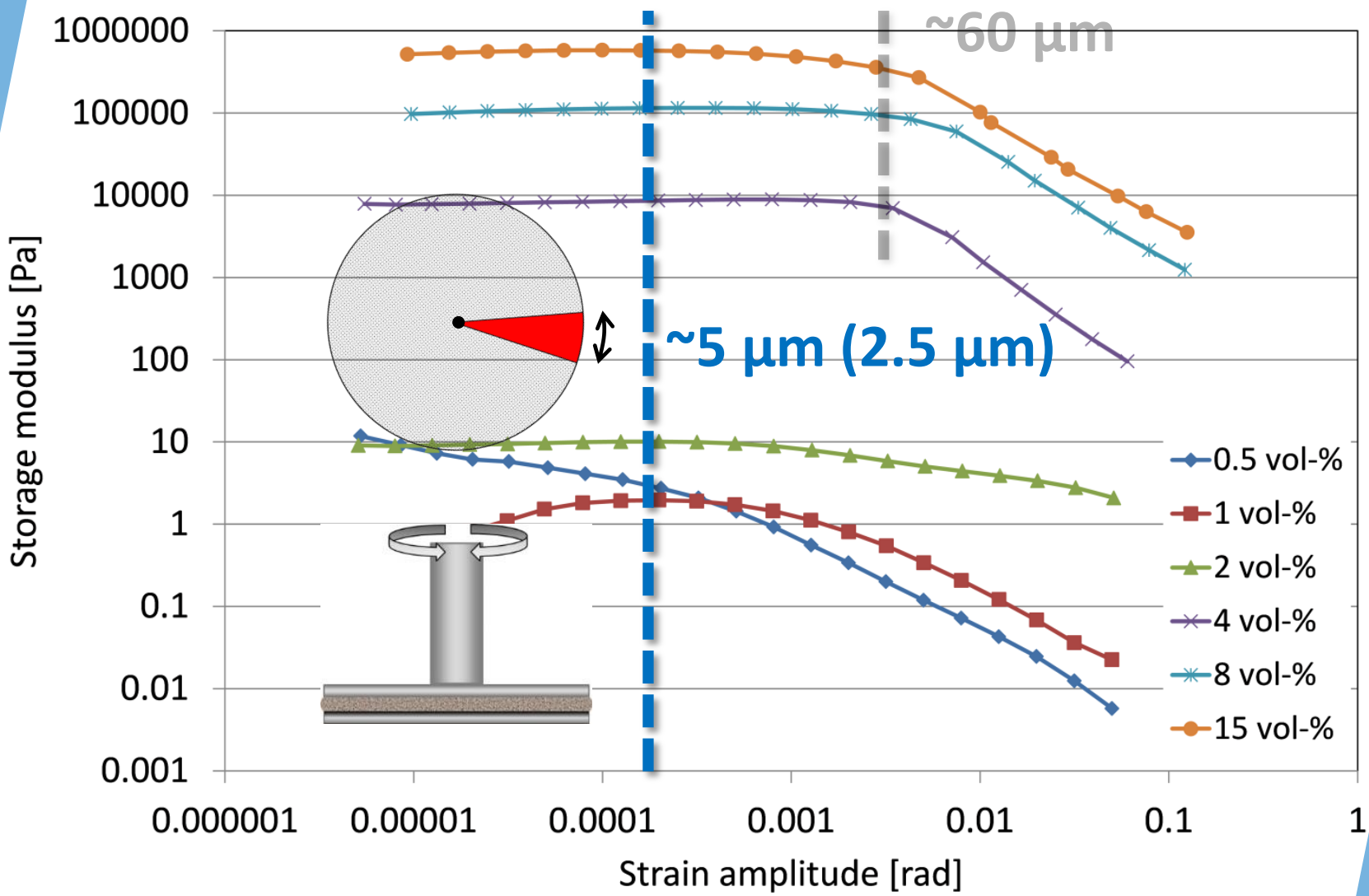
Fast deformation

VISCOELASTIC FLUID

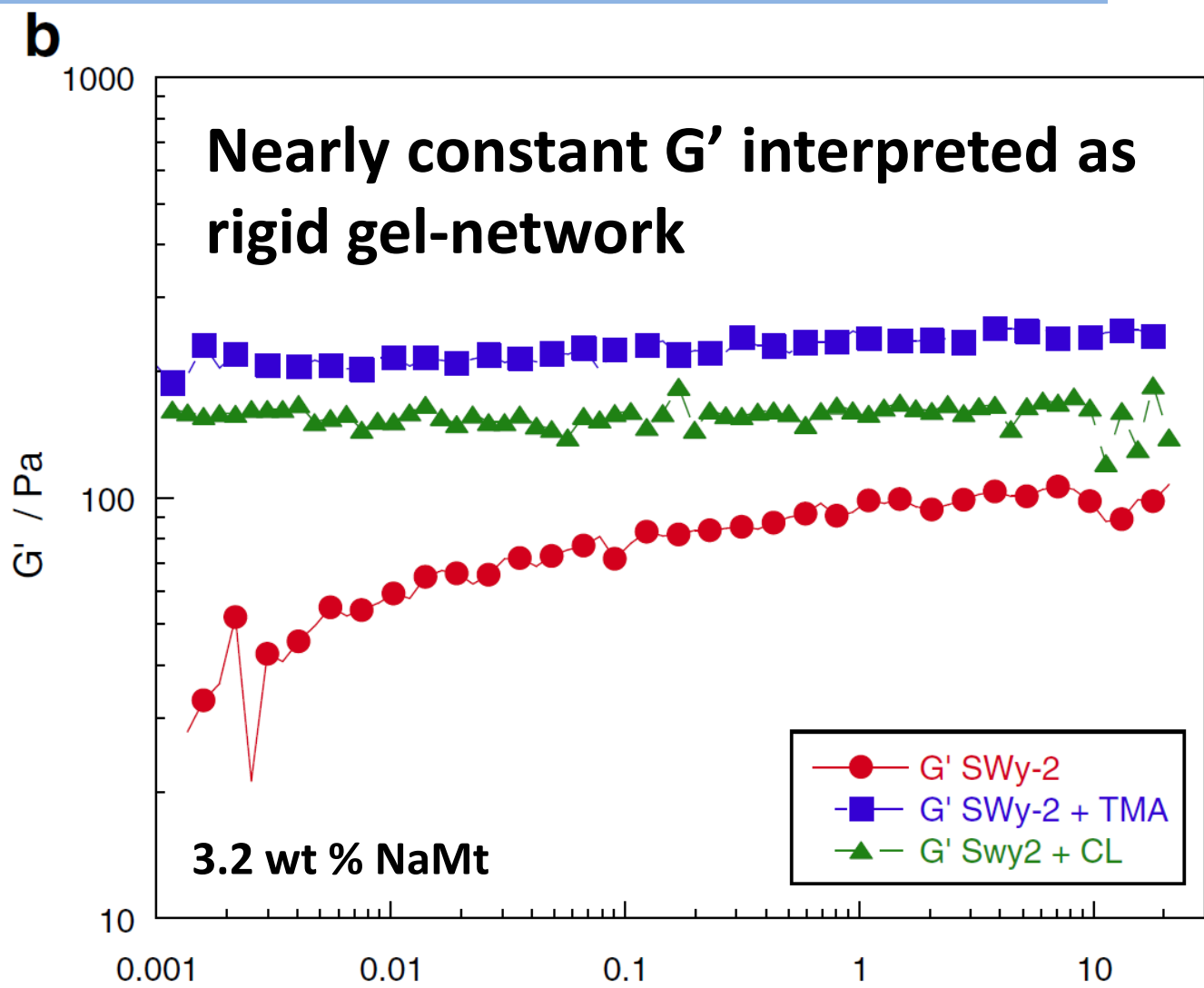


Reorganization and relaxation

50/50 Na/Ca-Mt, 1 mM NaCl

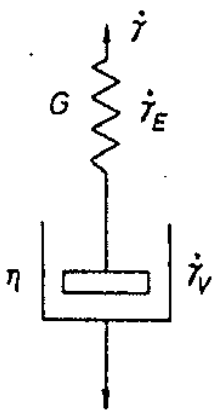
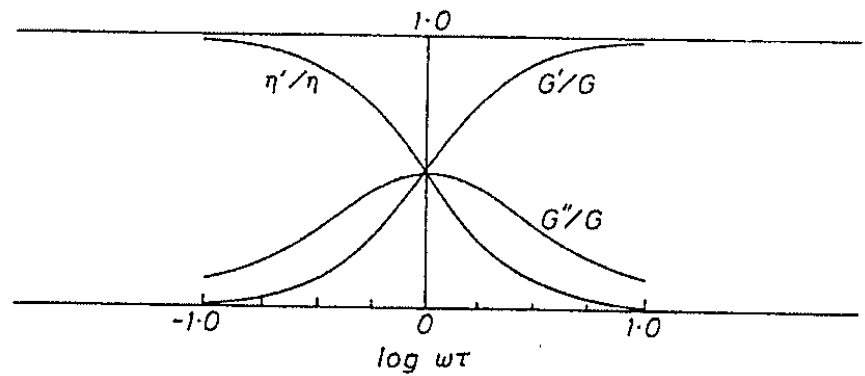
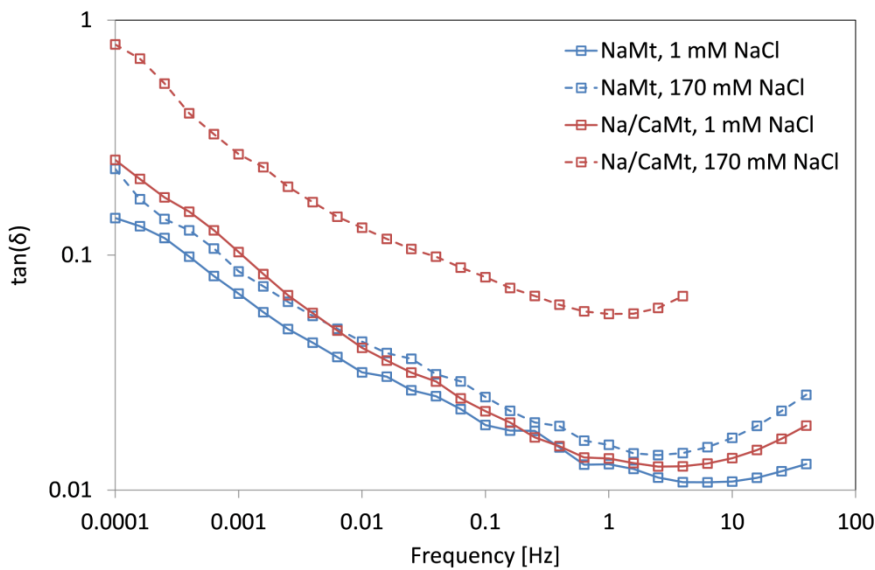
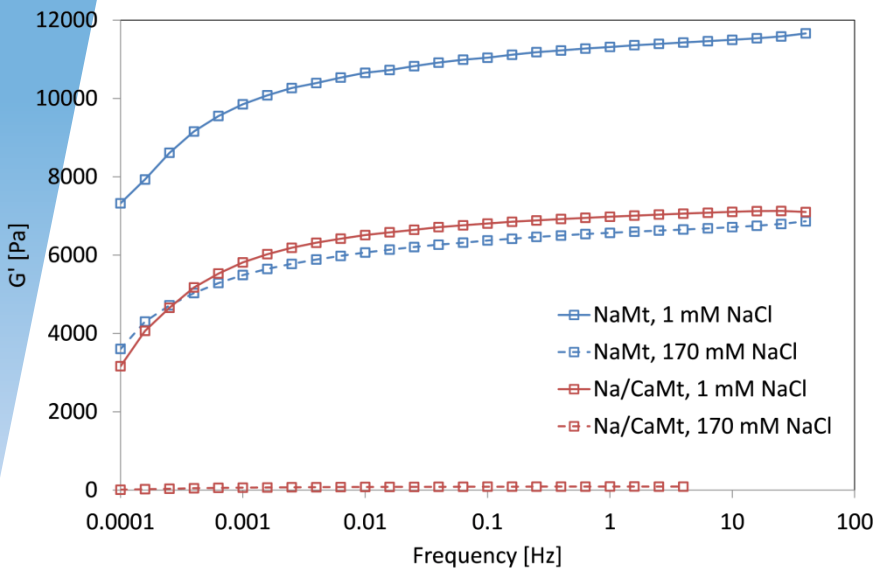


Dynamic response to strain



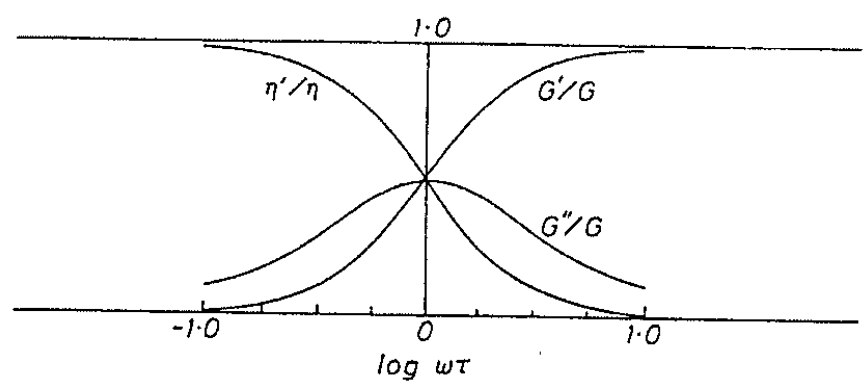
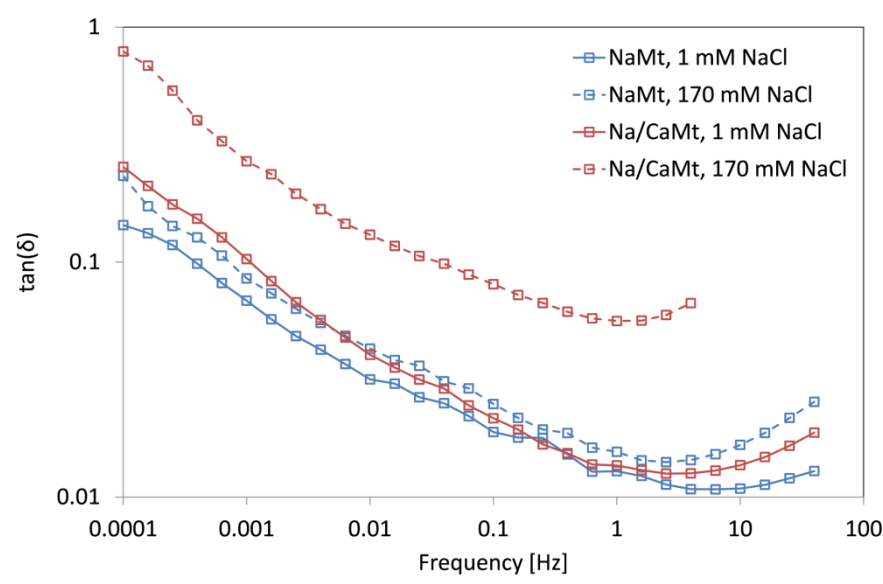
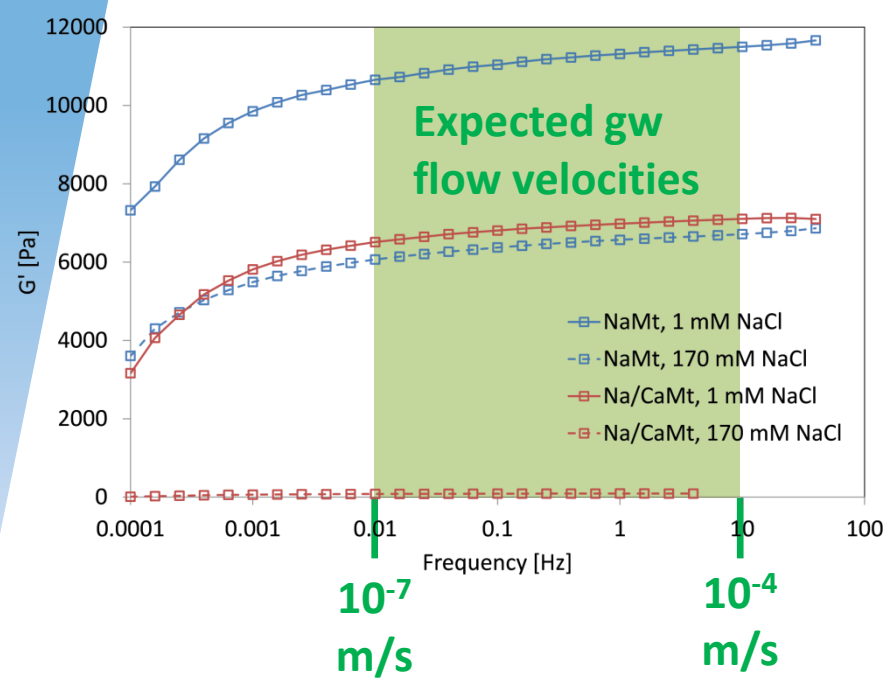
Bailey *et al.*, *Rheol. Acta*, **2014**, 53, 373.

Dynamic response to strain



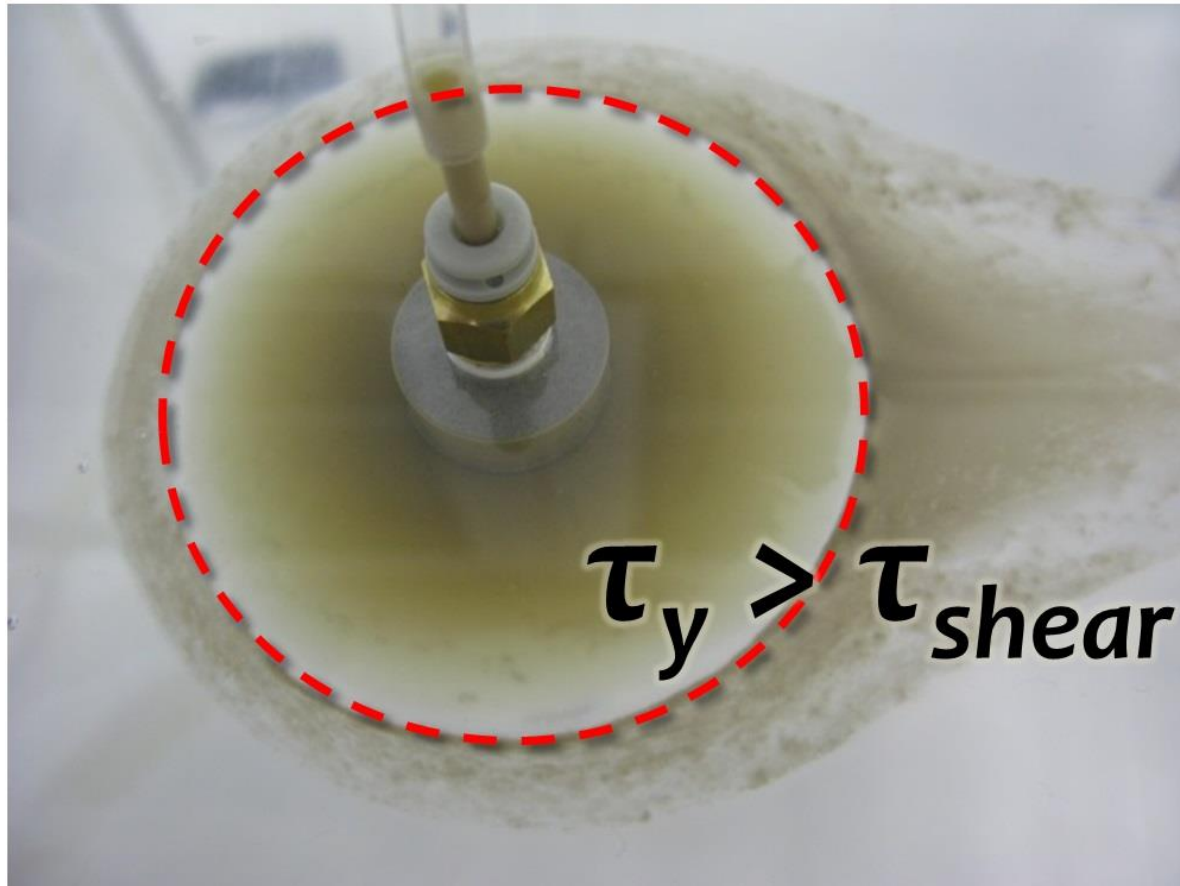
$$\tan \delta = \frac{G''}{G'}$$

Dynamic response to strain



$$\tan \delta = \frac{G''}{G'}$$

Consequences?



Effect of prolonged small shear stress?

Activities

- **Manuscript accepted for publication in Applied Clay Science:**

"Rheological Properties of Clay Material at the Solid/Solution Interface formed under Quasi-Free Swelling Conditions"

Rasmus Eriksson & Tim Schatz, Appl. Clay Sci. 108 (2015), 12.

- **One manuscript on the nature of dilute / semi-dilute clay suspensions**

- **Abstracts to conferences:**

Clay Conference in Brussels (March 23-26) (Yield strength of extruding material)

5th International Colloids Conference in Amsterdam (June 21-24) (Nature of dilute / semi-dilute clay suspensions)