



## Impact of continuous phase and particle content on rheological behaviour of apple cells suspensions

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### ► To cite this version:

Cassandre Leverrier, Giana Almeida Perré, Gerard G. Cuvelier. Impact of continuous phase and particle content on rheological behaviour of apple cells suspensions. 20th Anniversary Meeting of the European Society of Rheology: "Can rheology save the world?", Mar 2016, Zürich, Switzerland. . hal-03322517

**HAL Id: hal-03322517**

**<https://hal.science/hal-03322517>**

Submitted on 19 Aug 2021

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# Impact of continuous phase and particle content on rheological behaviour of apple cells suspensions

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The research leading to these results has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 311754

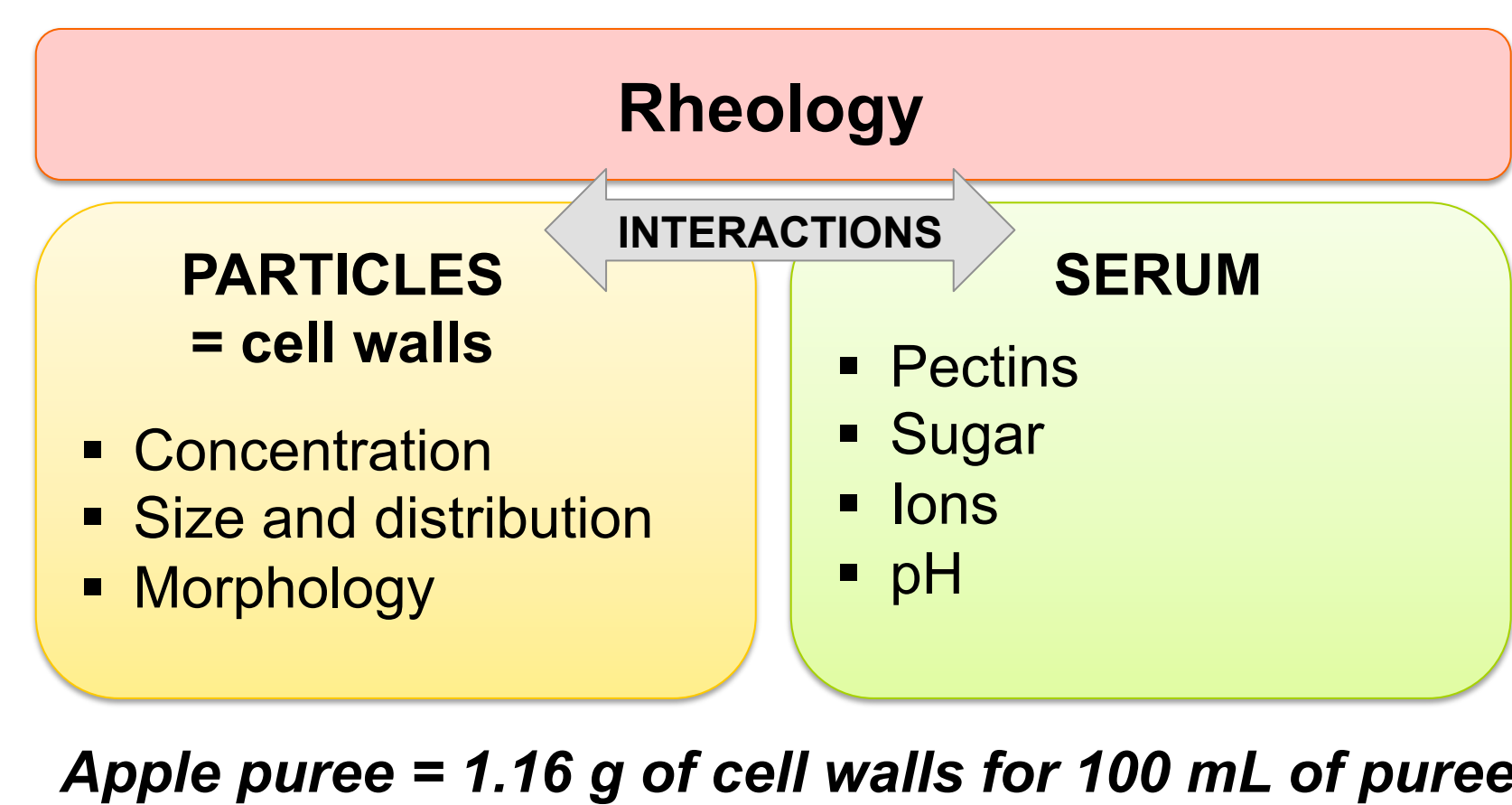
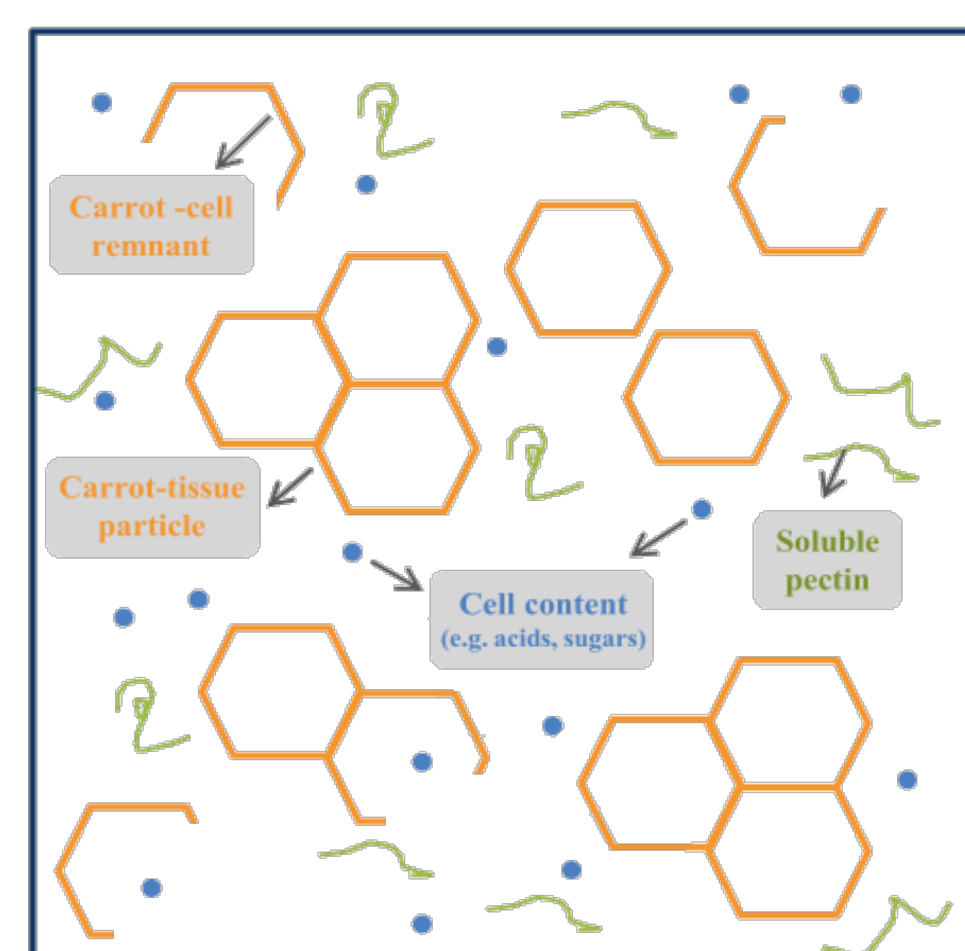
## Research question:

*How does continuous medium impact rheological behaviour of fruit suspensions ?*

## Strategy & Context

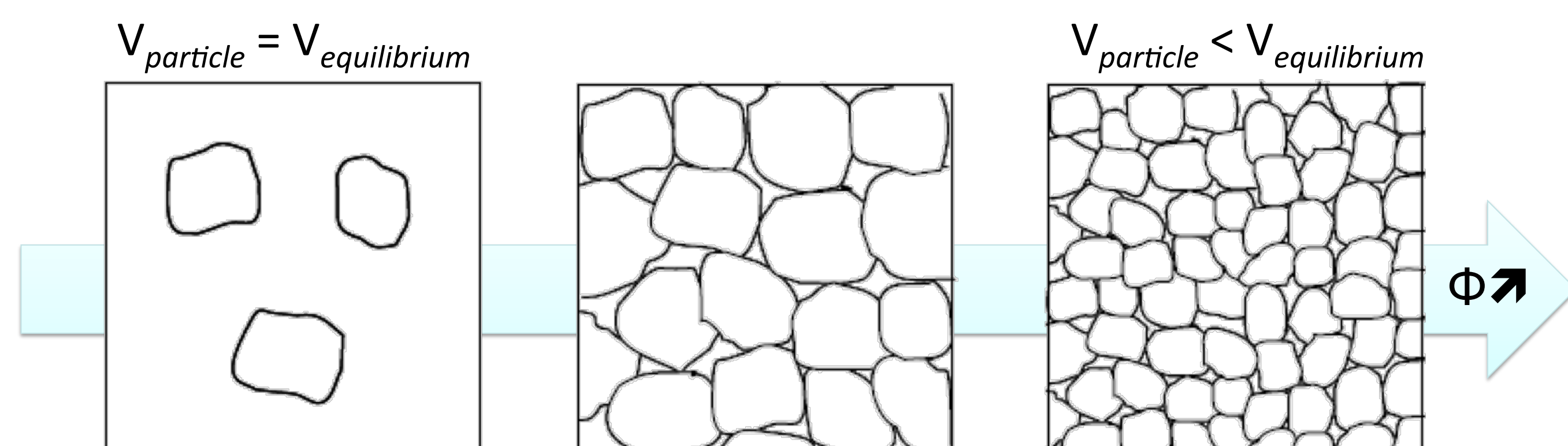
In food industry, controlling texture allows to generate innovative products and to deal with consumer expectations.

Fruit purees = suspensions of deformable cells or cell clusters

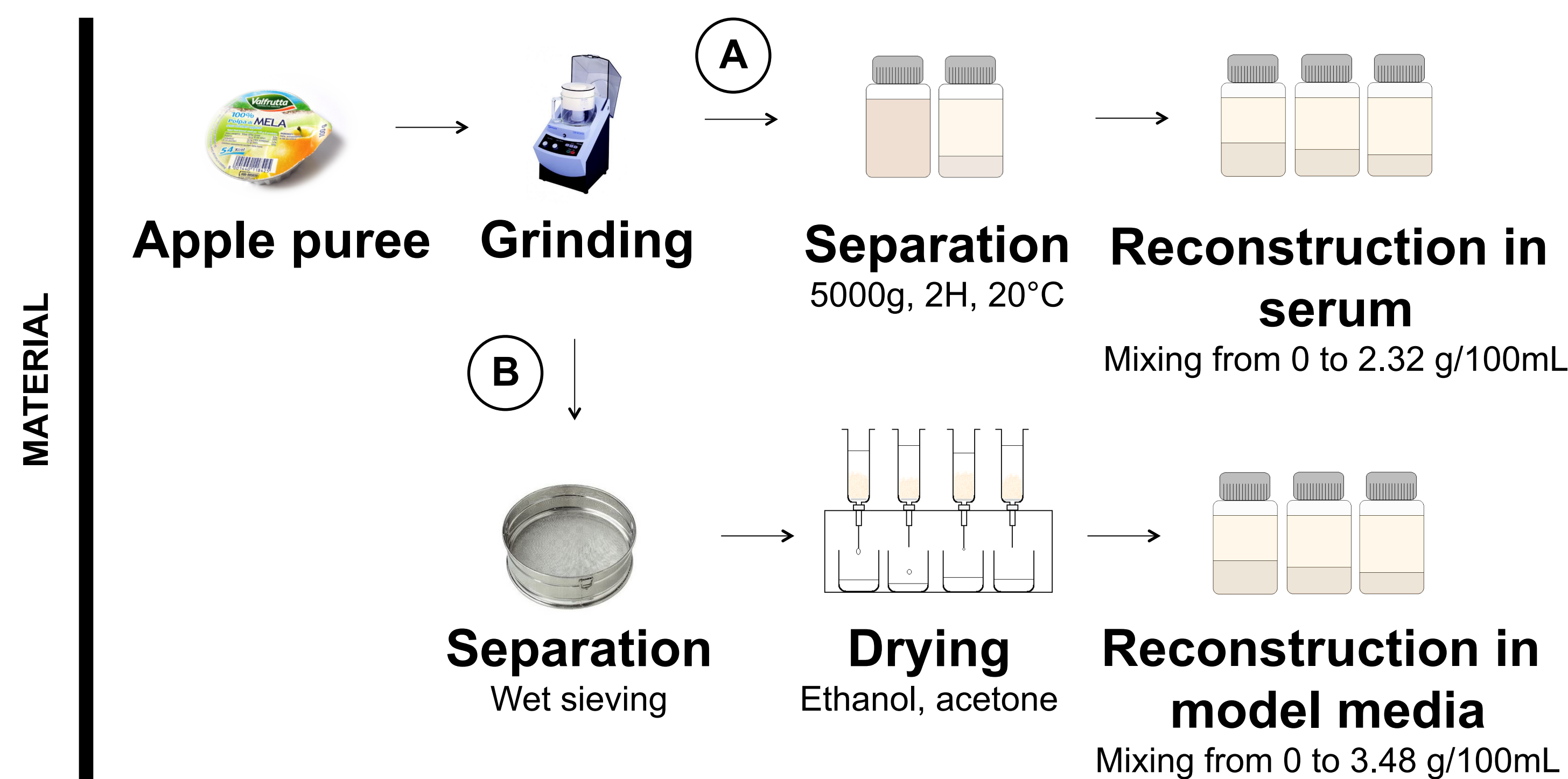


Construction of apple cells suspensions varying in :

- ✓ particle concentration (from 0 to 3.48g/100mL)
- ✓ continuous phase



## Material and Methods



	Water	NaCl 0.1%	Sucrose 48% <sub>m</sub>	Serum	CMC 1%	CMC 3.2%
$\eta$ mPa.s	1	1	13	13	13	108
$\rho$ g.cm <sup>-3</sup>	0.9982	1.000	1.219	1.051	1.006	1.018
Conductivity $\mu S/cm$	0.80	1750	18	1730	2000	6000

### Rheology

MCR 301, Anton Paar, using large gap coaxial cylinders ( $\delta r=5mm$ )

#### Steady-state measurements

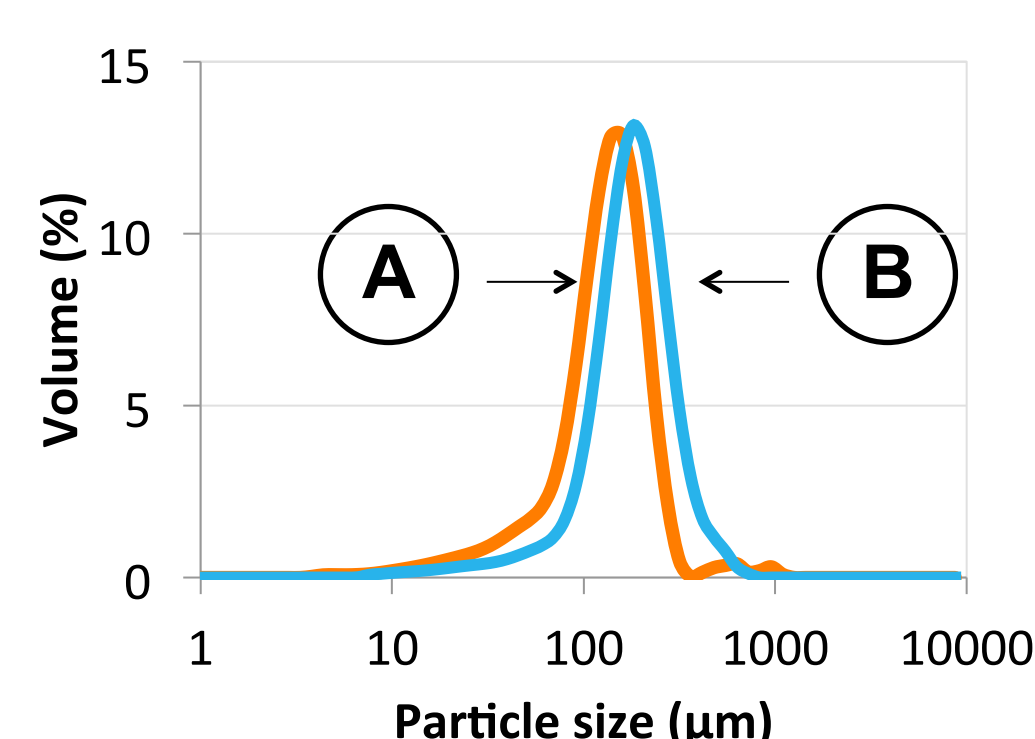
Apparent viscosity after 1min at 50s<sup>-1</sup>

#### Oscillatory measurements

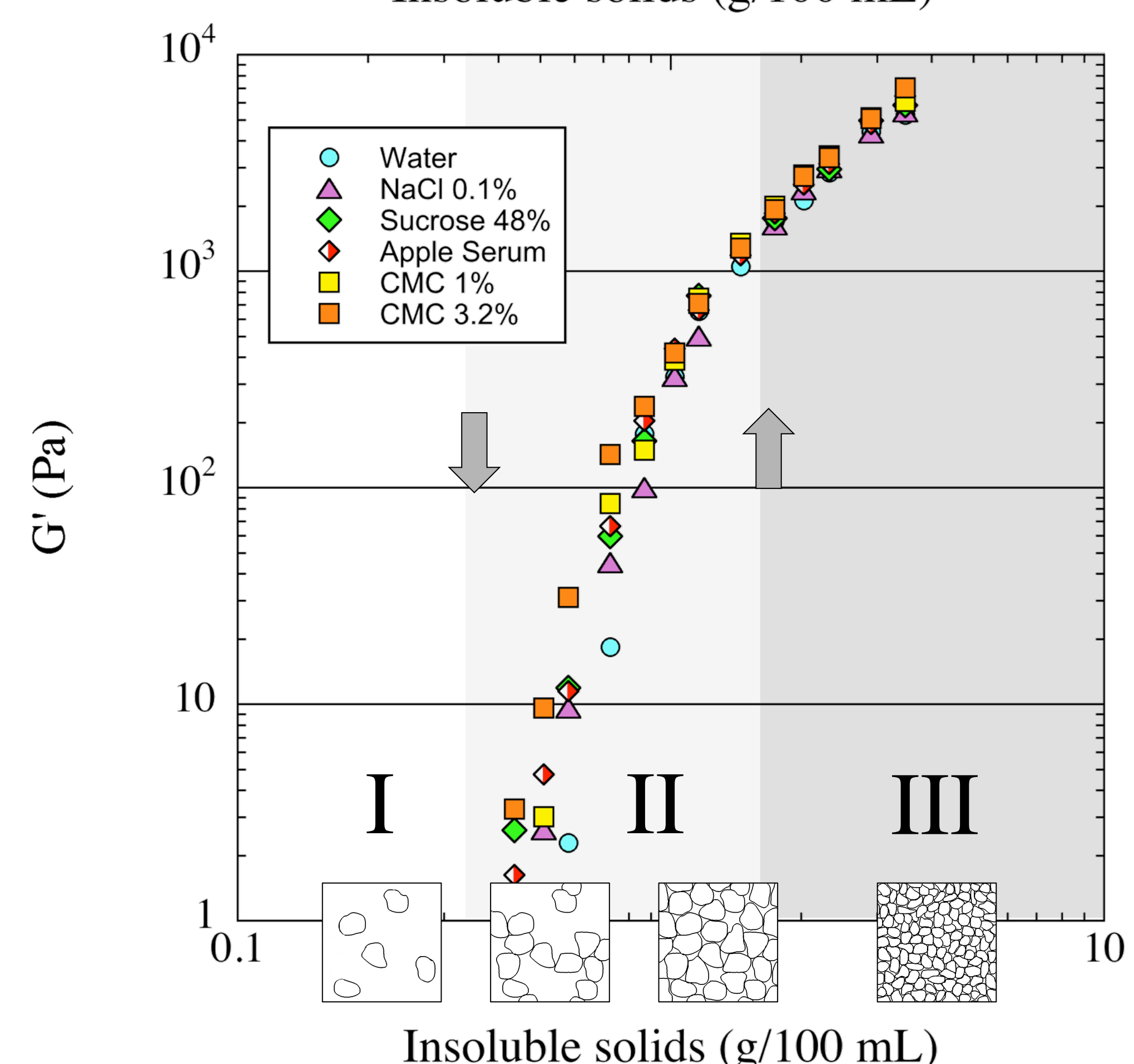
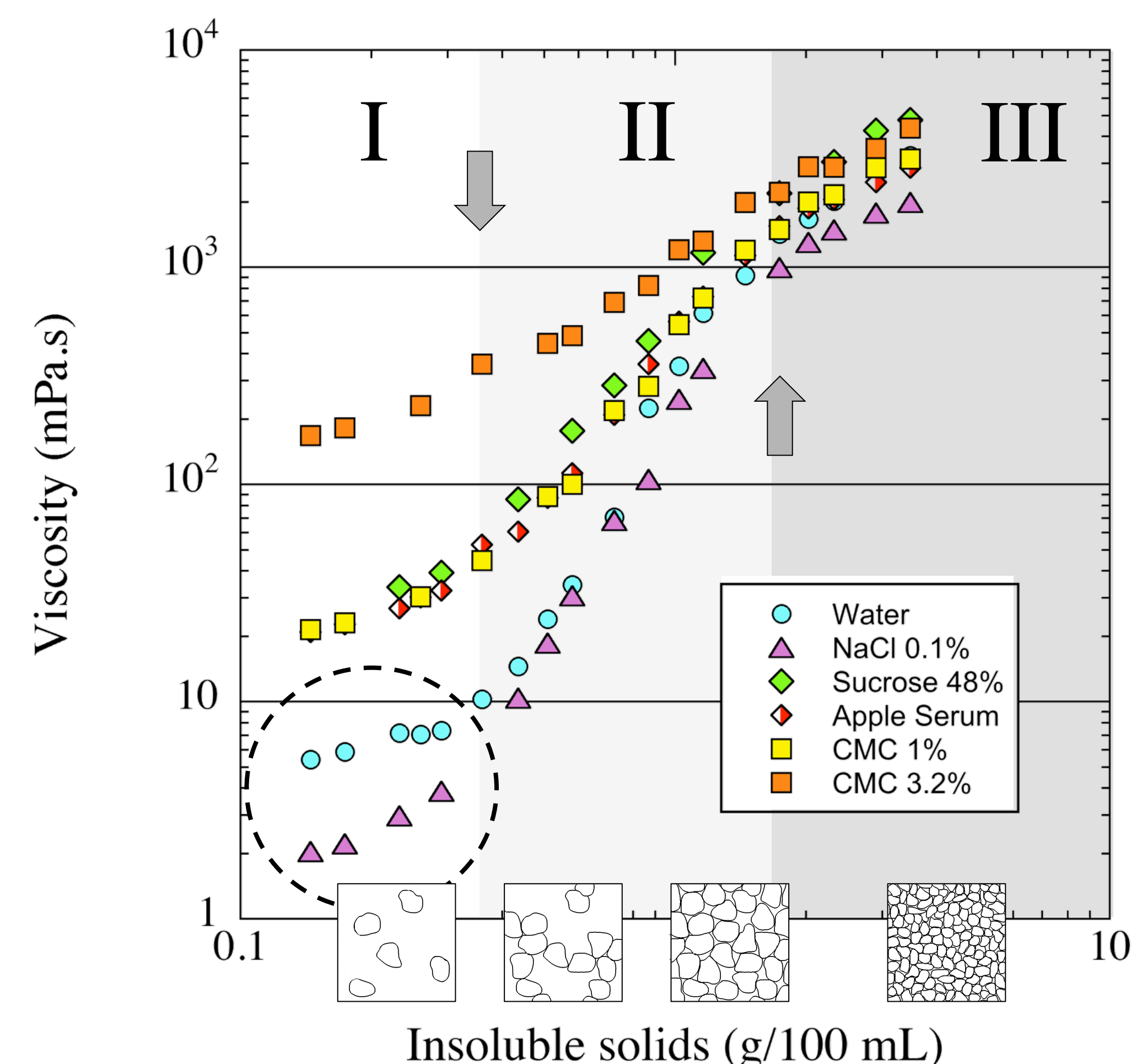
Strain sweep from 0.015% to 150% was performed at 10rad.s<sup>-1</sup>.

### Particle size distribution

Mastersizer 2000, Malvern



## Results



## Conclusions

Rheological parameters increase with the particle content. This study confirms that **particle content** has a **major impact** on rheological behaviour of apple cells dispersions, and highlights **three concentration domains**, both in flow and dynamics measurements.

- The **diluted domain** exhibits Newtonian flow. Ionic strength appears to impact only in distilled water inducing electrostatic repulsion between particles which increases viscosity values.
- The **intermediate domain** is characterised by the building of a weak network between particles. Continuous phase have a little effect in this domain, but its viscosity and ionic strength seem to impact the elastic modulus in this domain.
- In the **concentrated domain**, the dependency between viscosity and concentration decreases. Particles begin to pack and their volume becomes lower than their equilibrium volume. Continuous phase has no longer any impact on  $G'$ , the interactions between particles are the only parameters affecting elastic properties in this domain.

The continuous phase seems to have no impact on transition domains.

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