PASSIVE MICRORHEOLOGY : NON CONTACT MEASUREMENT OF VISCOELASTIC PROPERTIES OF BIOPOLYMERS

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This work presents a new technique of the passive microrheology for the study of the microstructure properties of soft materials. Our technology uses Multi Speckle DWS (MS-DWS) set-up in backscattering with a video camera. It allows to measure the mean displacement of the microstructure particles in a spatial range between 0,1 and 100 nm and a time scale between 10^{-1} and 10^{5} seconds. Different parameters can be measured or obtained directly from the Mean Square Displacement (MSD) curve like a fluidity index, an elasticity factor, a viscosity factor, a relaxation time, a MSD slope… Also when the particles move only thanks to the Brownian motion, the Generalised Stokes Einstein Relation given by Mason and Weitz can be applied to calculate the visco-elastic moduli G' and G'' over a large frequency range.
This technique allows to monitor the evolution of the microstructure, the restructuration after shearing, the variation of the viscoelastic properties versus temperature, pH, the physical stability of emulsion or suspension...

This work focuses on viscoelastic properties evolution and will show application examples and advantages of using a non intrusive method for :

- Gelation process of food products in order to measure the speed of the gelation and the final strength of the network (mesh size)
- Methylcellose viscoelastic properties evolution versus temperature
- Carraghenan networks formation and comparison of their viscoelastic properties versus concentration.

References :

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