Séminaire

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Amphithéâtre Henri Benoît

Thomas Zemb

LGP/ENSIACET Toulouse

Is a "single phase" phase really single?

In the field of physical chemistry, a sample of complex fluids made with three components or more is described as single-phase if it exhibits no turbidity or resistance to sedimentation, and if its structure is restored by scattering after one or more temperature cycles. Statistical thermodynamics is more precise in its theory and usage of the “binodal” and “spinodal” line concepts. Kevin Roger recently demonstrated that, in systems containing hydrotropes, spontaneous emulsification often occurs during dilution, though not always, as this depends on the kinetics of mixing/demixing. This phenomenon is known as the “ouzo” effect. Therefore, a third type of boundary line between clearly single-phase and clearly two-phase systems should exist.

Absolute measurement of the scattered light scattered by the method initiated by Gouÿ in ternary fluids often detects two types of fluctuations that can be understood either as short-term living “droplets”, or as fluctuations as hetero-phase fluctuations. Spontaneous emulsification occurs when the lifetime of these diverges, and is described in papers under various names, such as mesoscale solubilization, the pre-ouzo effect, SFME and “haze” in chemical engineering.

We will tentatively propose that all these effects can be rationalized by combining the extensive entropy concepts suggested by H. Reiss (1974) and S. Marcelja (2017) in a consistent way with A. Onuki's (2011) approach to droplet formation involving surface-active molecules or antagonistic salts.

Les personnes souhaitant rencontrer l’orateur sont priées de prendre contact avec Marie-Pierre Krafft.