Polyamorphism in oxide glasses

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Polyamorphism, which is the ability for a system to form several distinct amorphous phases of identical composition, is an intriguing and yet poorly understood phenomenon. Prototypical systems exhibiting polyamorphism (PA) during compression include H_2O, SiO_2, GeO_2, B_2O_3 which all exist in low- and high-density amorphous states.[1] These states generally differ in their properties (e.g., density and rigidity) and PA may have practical implications for the design and control of new materials with specific properties.[2] From a fundamental point of view, this phenomenon is of tremendous importance since, in addition to an obvious connection with crystalline polymorphism, PA likely may reflect the existence of liquid-liquid transitions at higher temperatures.

In this presentation, we will present the important contribution of XRS spectroscopy in the understanding of the pressure-induced modifications of some glassy oxides (borates, germanates, …) view through the modifications of the local environment of low-Z elements.[3]

References

[1] - P.F. McMillan, Journal of Materials Chemistry **14**, 7 (2004) / D. Machon, *et al.* , Progress in Materials Science **61**, 216-282 (2014).
[2] - P.F. McMillan, Nature **1**, 19 (2002).
[3] - G. Lelong *et al.* Physical Review B **85** (2012) / G. Lelong *et al.* Inorganic Chemistry **53**, 10903 (2014).