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# Characterization of the structural of disorder in glasses and transparent polycrystalline ceramics using solid-state NMR methods

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## Résumé

Characterizing the structure of disordered systems lacking of long-range 3D periodicity, like glasses, remains a challenging experimental task. Over the last years, various solid-state NMR methods have been proposed to obtain detailed short and longer-range structural information in disordered systems [1]. In this work, we have used this NMR approach to probe the structure and to describe the extent and nature of disorder in two systems. First, we will describe the use <sup>29</sup>Si homonuclear through-bond multiple-quantum NMR experiments and <sup>71</sup>Ga very-high field NMR spectra to characterize and quantify the chemical disorder in <sup>29</sup>Si-enriched SrGa<sub>2</sub>Si<sub>2</sub>O<sub>8</sub> transparent polycrystalline ceramic [2] as well as in the parent glass. Then, we will discuss the structure of complex glasses in the SiO<sub>2</sub>-Na<sub>2</sub>O-Ga<sub>2</sub>O-Nb<sub>2</sub>O<sub>5</sub> system which contain "incompatible" glass formers. In that case, <sup>29</sup>Si, <sup>71</sup>Ga, <sup>23</sup>Na, <sup>95</sup>Nb and several double-resonance NMR experiments complemented with TEM microscopy have been employed to study the nature of disorder in homogeneous and nanostructured glasses having potential applications in optics [3].

Key words: solid state NMR, glasses, chemical disorder, nanostructure

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