

## European Network on NMR Relaxometry

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# DYNAMICS OF IONIC LIQUIDS IN CONFINEMENT OF SiO<sub>2</sub> NANOPARTICLES INVESTIGATED BY MEANS OF <sup>1</sup>H AND <sup>19</sup>F NMR RELAXOMETRY

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Ionic liquid (IL) - 1-Butyl-3-methylimidazolium tetrafluoroborate [BMIM][BF<sub>4</sub>] in bulk and in confinement of SiO<sub>2</sub> nanoparticles is a subject of <sup>1</sup>H and <sup>19</sup>F Nuclear Magnetic Resonance relaxometry experiments. The experiment was performed in frequency range 4 kHz up to 40 MHz (referring to <sup>1</sup>H and <sup>19</sup>F resonance frequency) to probe motional processes of different timescales. Temperature range was 233 K – 303 K. Analysis of data reveals information on translational and rotational dynamics of IL both in bulk and in confinement.

The NMRD profiles (both <sup>1</sup>H and <sup>19</sup>F) for bulk liquid can be described by only relaxation term origination from translational dynamics. The profiles for confined ionic liquid suggests that additional motional processes are present. We assume that the overall that the overall relaxation of system is a sum of relaxation contributions from a bulk-like fraction of the confined liquid and from a fraction near the surface of silica nanoparticles

The dynamical behaviour of the pure and confined liquid will be discussed for different concentration of SiO<sub>2</sub> nanoparticles in [BMIM][BF<sub>4</sub>] in broad temperature range.

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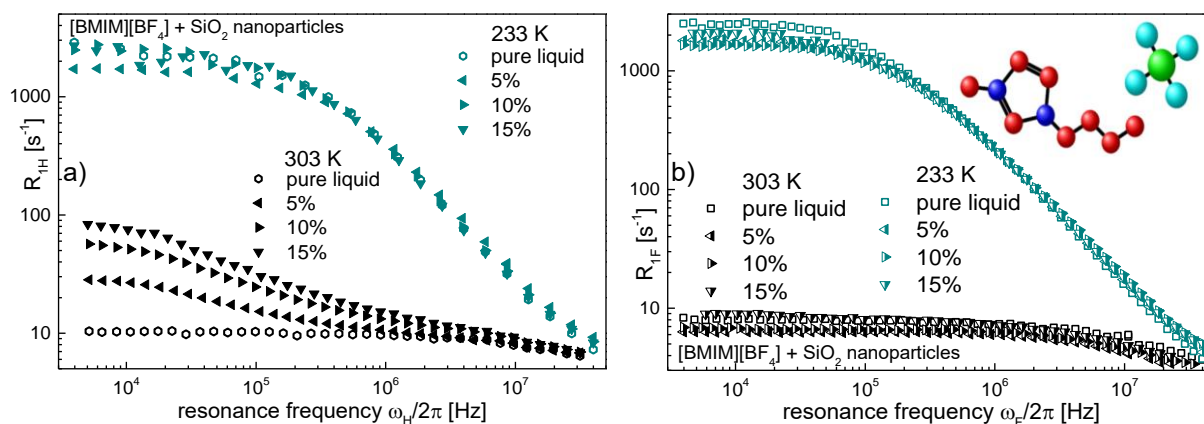


Fig. 1. Comparison of NMRD profiles for pure liquid and in confined of  $\text{SiO}_2$  nanoparticles for min and max temp only. a)  $^1\text{H}$  experiment, b)  $^{19}\text{F}$  experiment.