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Effect of nanoscopic confinement on the dynamics of ionic liquids

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Ionic liquids (ILs) are molten salts without additional solvent composed by organic cations and organic or inorganic anions. ILs show very interesting physical-chemical properties, such as high thermal and chemical stability, negligible vapour pressure, low flammability, high ionic conductivity, remarkable solvation capability towards a large variety of compounds, and in some cases even biocompatibility. These peculiarities make ILs as very attractive for a broad and diverse range of applications, from energy conversion to extraction and separation, pharmaceutics, biocatalysis, biomass treatment etc. Structure and ionic transport processes are extremely important for several of such applications in modern industry.

We have investigated the influence of nanoscopic confinement on the structure and diffusion properties of the IL EmimAc (1-Ethyl-3-methylimidazolium acetate). Structural modifications induced by the confinement were observed by means of xray diffraction. Neutron backscattering measurements at SPHERES@MLZ were used to investigate the dynamics in the ps/ns range. We observed thermal activated diffusion dynamics, well described by a jump diffusion model, with diffusion coefficients of the order of 6-9 10-7 cm2/s at 80 C. The effect of confinement is here evidenced by different dynamic behaviour as a function of the temperature.

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