

# Rheological characterization of ionic liquids and ionic liquid crystals with promising tribological performance

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## 1 Electronic Supplementary Information

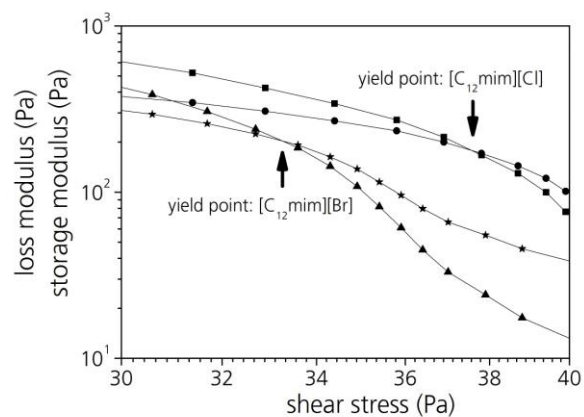
### 1.1 Values of the dynamic viscosities

**Table 1** Viscosity values of the ionic liquids (90 °C) and ionic liquid crystals (90 °C and 120 °C) at high shear rate ( $\dot{\gamma} = 1000\text{s}^{-1}$ , gap: 0.052 mm, cone: CP50-2/TP)

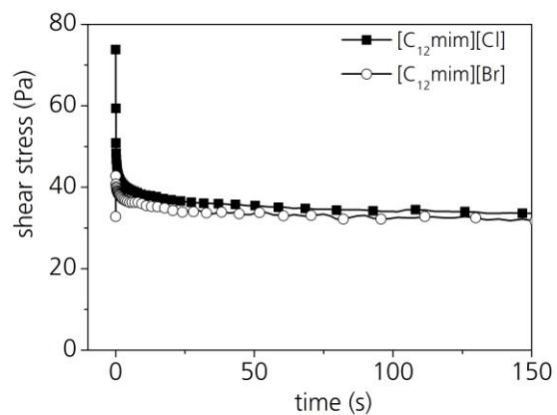
Ionic Liquids	Dyn. viscosity / $\text{mPa} \cdot \text{s}$	
	90 °C	120 °C
$[\text{C}_2\text{mim}][\text{PF}_6]$	16	-
$[\text{C}_2\text{mim}][(\text{CF}_3\text{SO}_2)_2\text{N}]$	7	-
$[\text{C}_4\text{mim}][\text{PF}_6]$	21	-
$[\text{C}_8\text{mim}][\text{PF}_6]$	34	-
$[\text{C}_8\text{mim}][(\text{CF}_3\text{SO}_2)_2\text{N}]$	12	-
$[\text{C}_{12}\text{mim}][\text{PF}_6]$	60	-
$[\text{C}_{12}\text{mim}][\text{Cl}]$	861	75
$[\text{C}_{12}\text{mim}][\text{Br}]$	719	65

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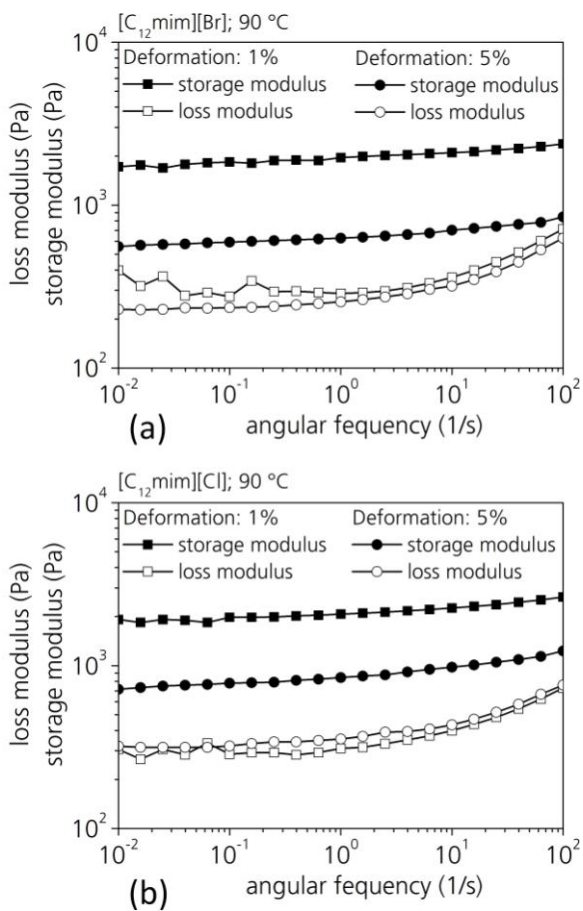
## 1.2 Yield-stress, frequency sweeps and relaxation measurements



**Fig. 1** Comparison of the yield-stress of  $[C_{12}mim][Cl]$  and  $[C_{12}mim][Br]$  measured in oscillatory mode with plate-plate configuration at  $90^\circ C$  and 1.0mm gap



**Fig. 2** Comparison of the relaxation of  $[C_{12}mim][Cl]$  and  $[C_{12}mim][Br]$  with constant deformation of 10% using plate-plate configuration at  $90^\circ C$  and 1.0mm gap



**Fig. 3** Frequency sweeps with 1% and 5% deformation of a)  $[C_{12}mim][Br]$  and b)  $[C_{12}mim][Cl]$  measured in oscillatory mode with plate-plate configuration at 90 °C and 1.0mm gap