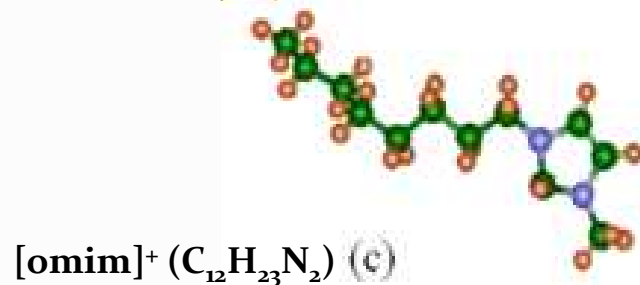
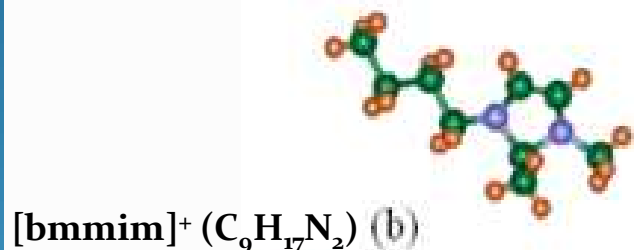
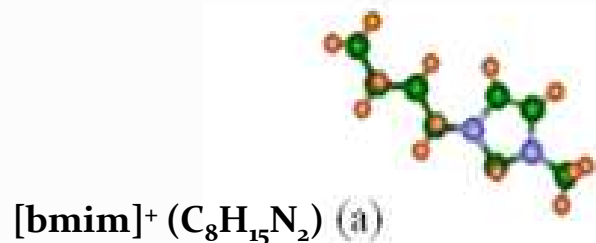


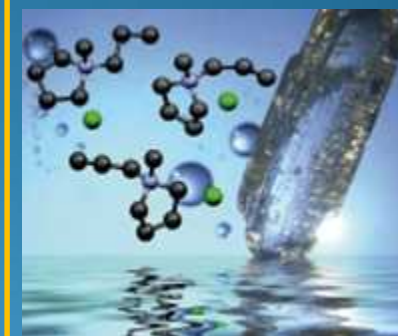
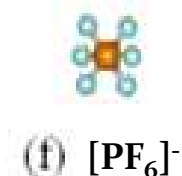
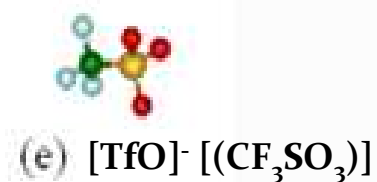
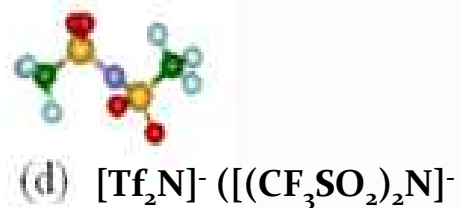
What is RTILs (Room Temperature Ionic Liquids)?

Structure of anions and cations constituting the room-temperature ionic liquids

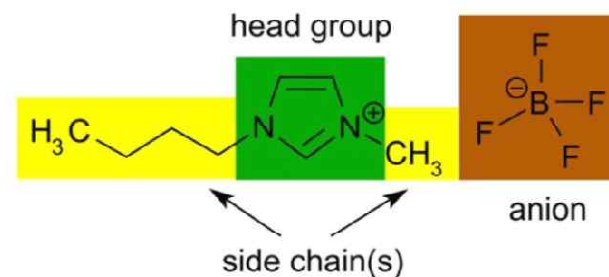
cation



anion

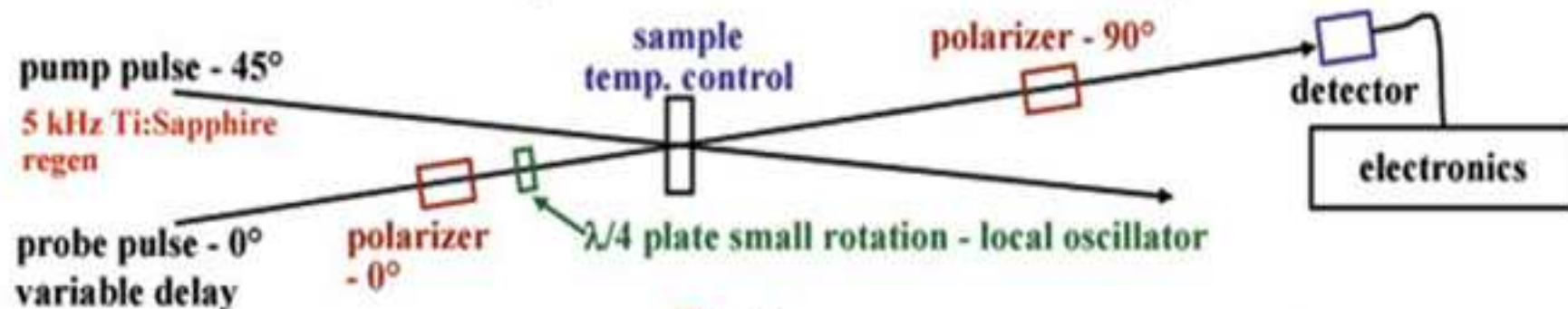


Ionic Liquid

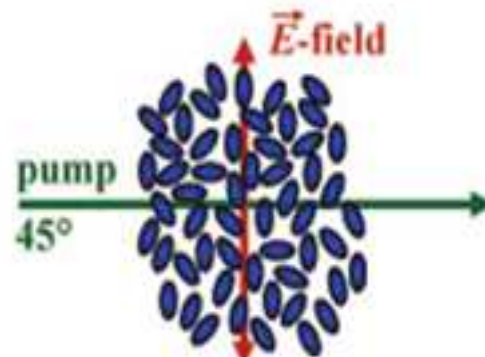


What is OKE (Optical Kerr Effect) ?

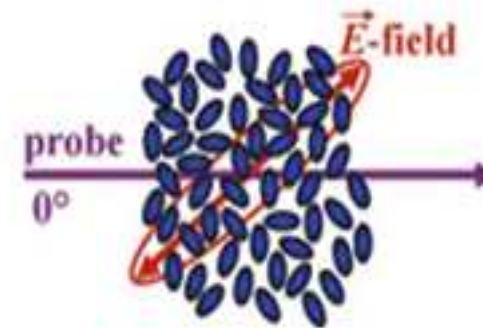
Optical Heterodyne Detected Optical Kerr Effect Method Orientational Dynamics of Molecules in Pure Liquids



Before pump,
random
orientations.



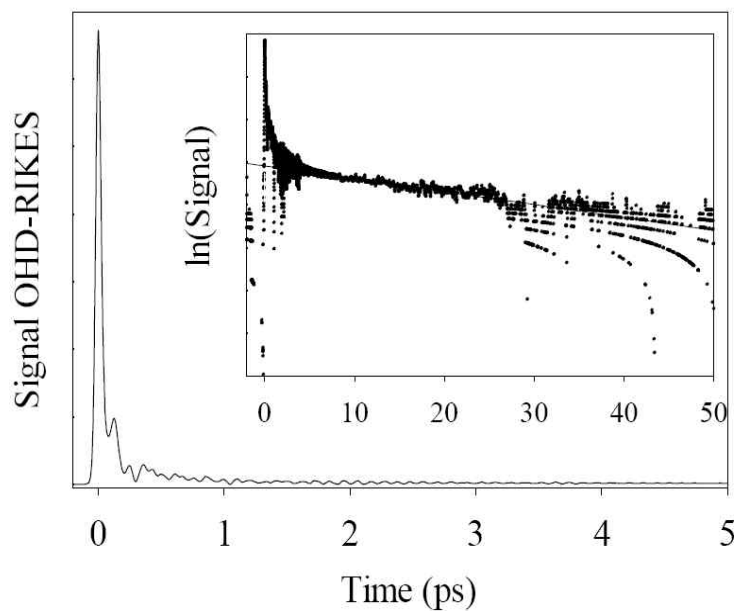
Pump E -field induces
small net alignment.
Sample birefringent.



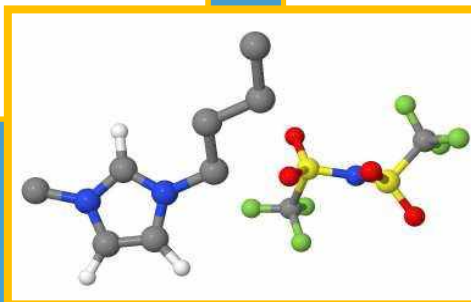
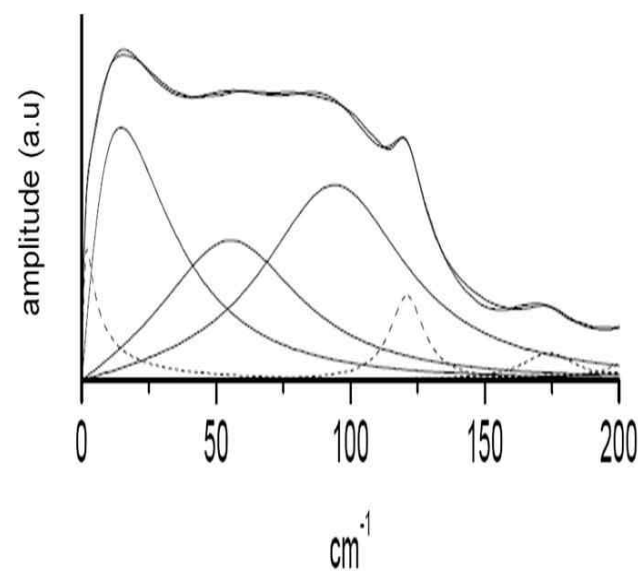
Birefringence makes probe elliptical.
Perpendicular component
heterodynes with local oscillator - signal.
Signal decays as orientations randomize.

What is OKE (Optical Kerr Effect) ?

Data Analysis



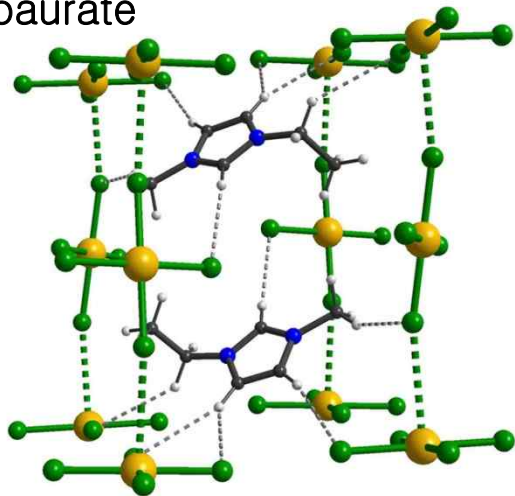
Fourier Transform



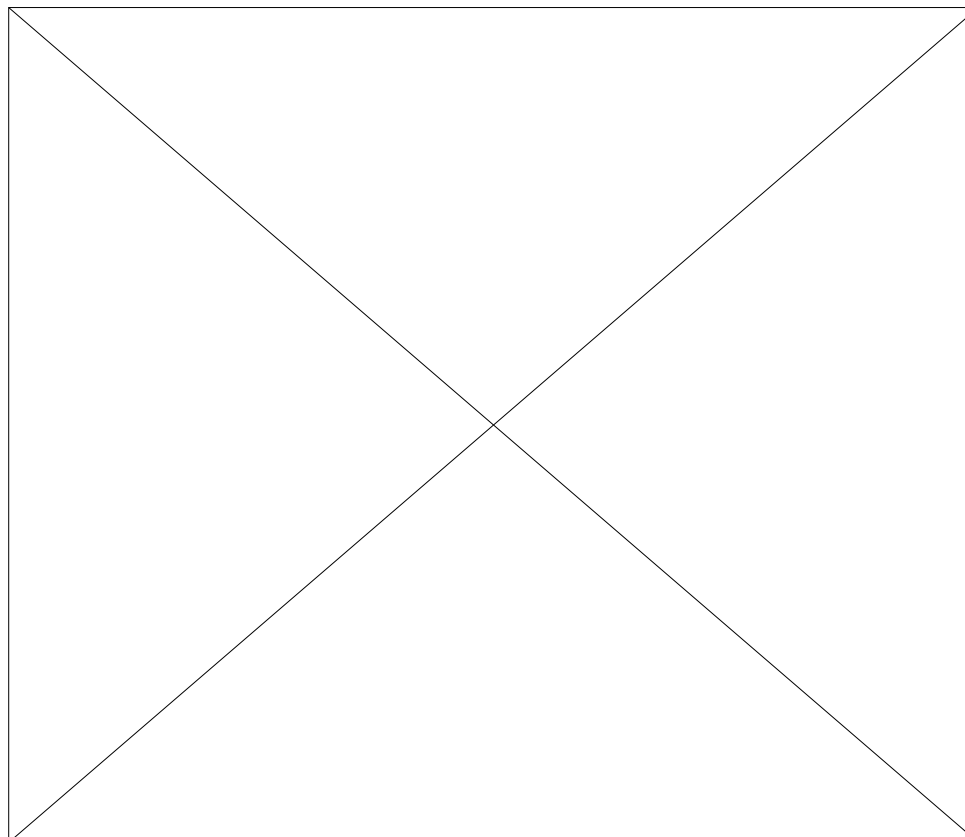
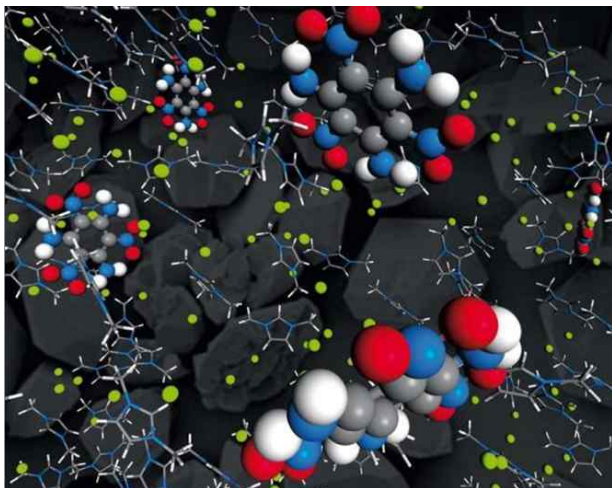
[bmim][Tf₂N]

Examples of RTIL

1-ethyl-3-methylimidazolium
tetrachloroaurate



TATB
(1,3,5-triamino-2,4,6-trinitrobenzene)



Another ionic liquid

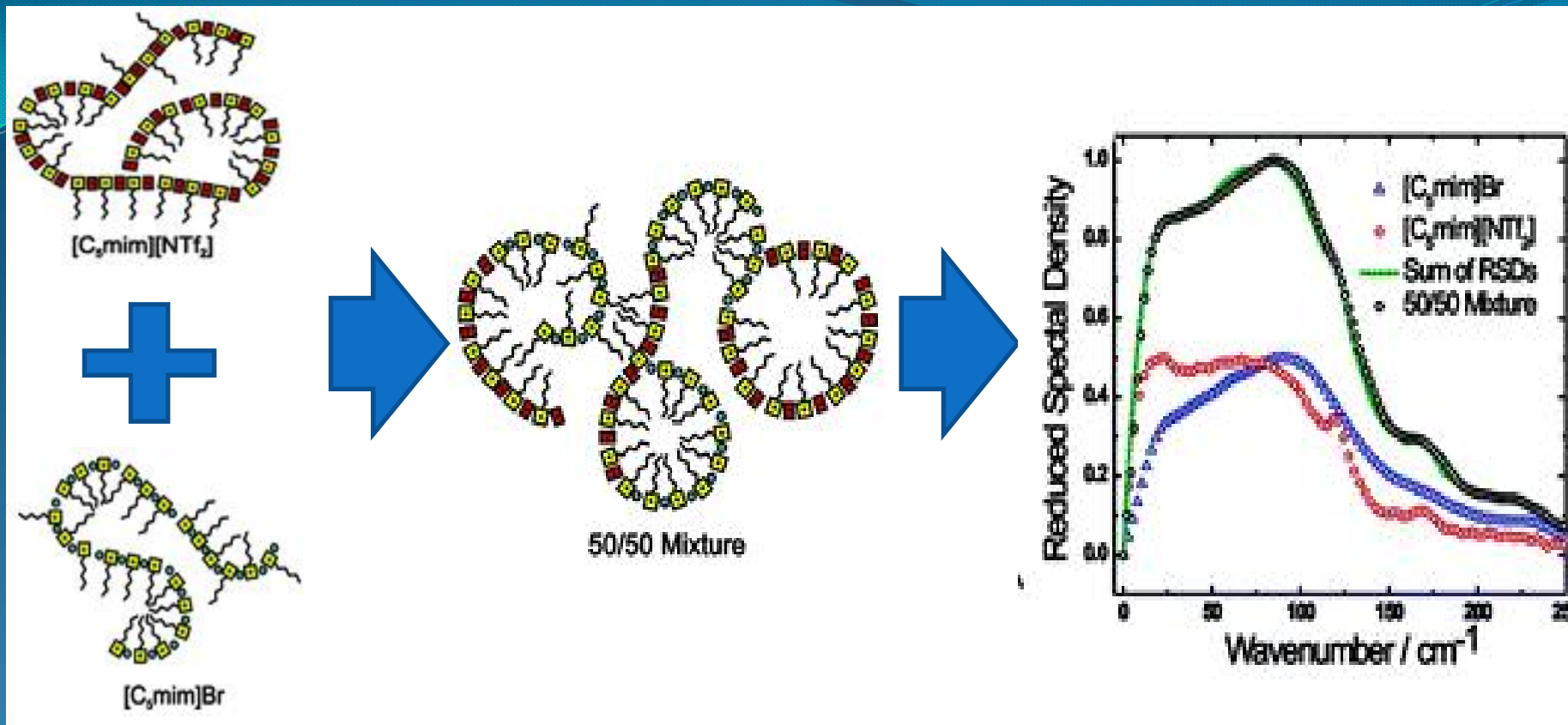
Additivity in the Optical Kerr Effect Spectra of Binary Ionic Liquid Mixtures: Implications for Nanostructural Organization

Dong Xiao, Justin Rajesh Rajian, Shengfu Li, Richard A. Bartsch, and Edward L. Quitevis*

Department of Chemistry and Biochemistry, Texas Tech University, Lubbock, Texas 79409

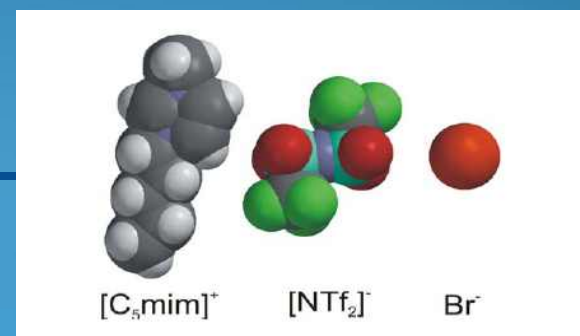
Received: June 15, 2006; In Final Form: July 11, 2006

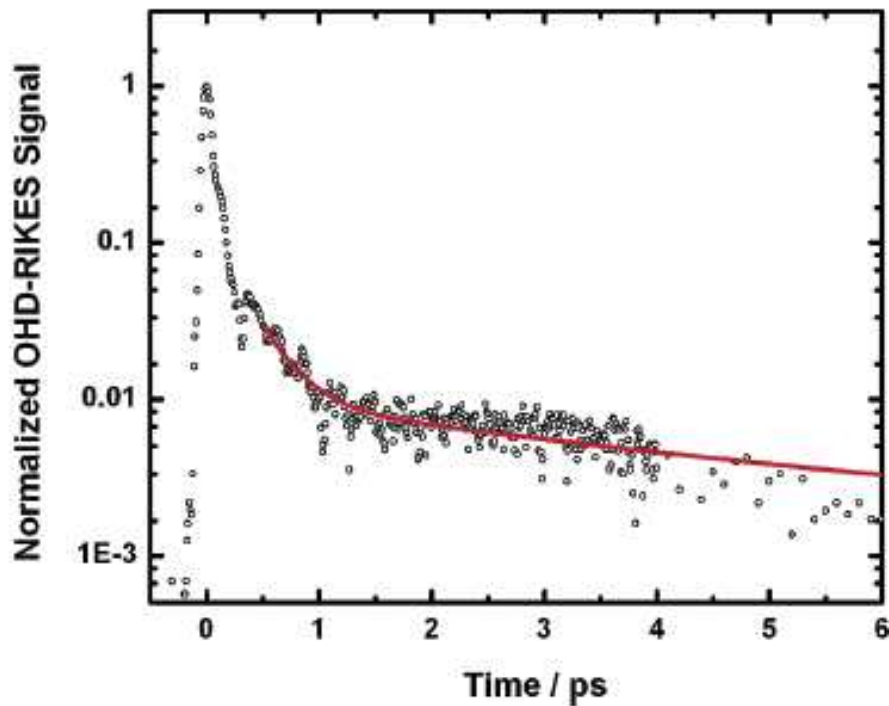
- Use optical heterodyne–detected Raman–induced Kerr effect spectroscopy (OHD–RIKES) was a Low–frequency spectra of binary room–temperature ionic liquid (RTIL) mixtures
- The spectra of these binary mixtures are well described by the weighted sums of the spectra for the neat RTILs.
- Additivity of the OKE spectra can be explained by locally ordered domains.



sample

- $[C_5mim][NTf_2]$
- $[C_5mim]Br$
- Mixtures of $[C_5mim][NTf_2]$ and $[C_5mim]Br$: $[C_5mim][NTf_2]$ mol fractions $x_{NTf_2}=0.25, 0.50, 0.75$





- Semilogarithmic plot of typical OHD-RIKES data for the $X_{\text{NTf}_2}=0.75$ mixture between -0.2 and 6ps at 295K .

- The solid red curve is a fit of the data to a biexponential decay function for $0.5 < t < 6\text{ps}$.

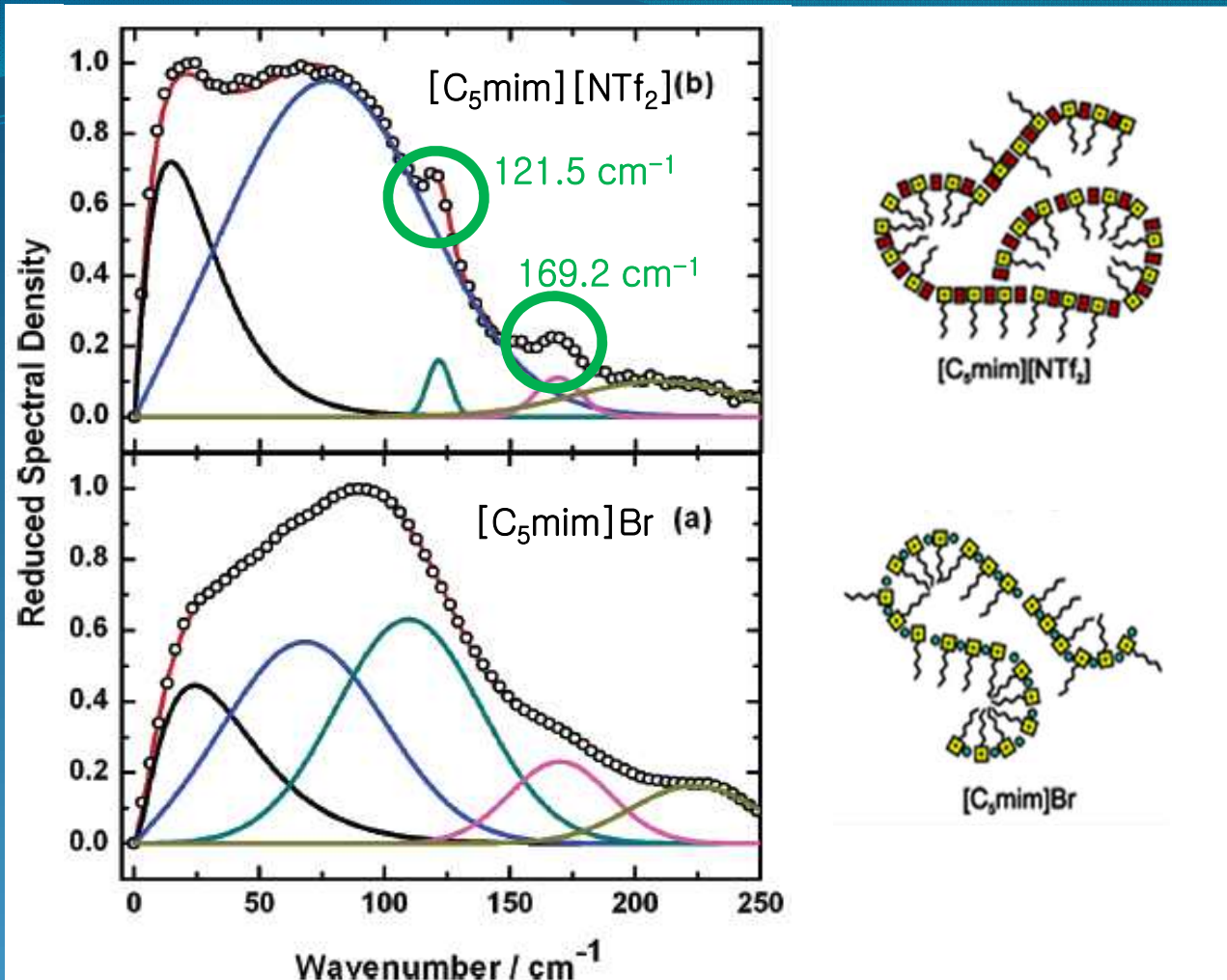
$$r(t) = A_1 \exp\left(-\frac{t}{\tau_1}\right) + A_2 \exp\left(-\frac{t}{\tau_2}\right) + B$$

TABLE 1: Fit Parameters for OHD-RIKES Response for $0.5 < t < 6 \text{ ps}^a$

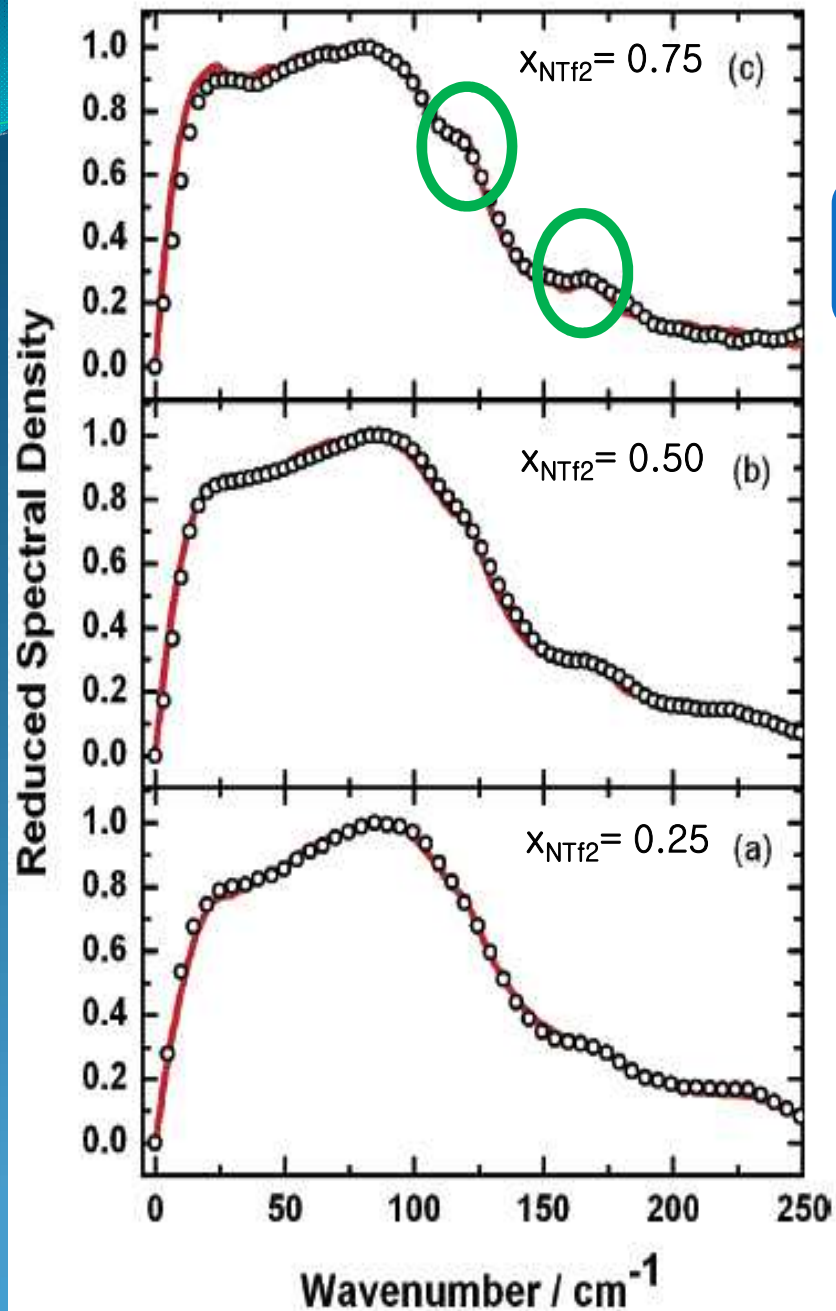
RTIL system	A_1	τ_1/ps	A_2	τ_2/ps	B
$[\text{C}_5\text{mim}]\text{NTf}_2$	0.8811	0.115 ± 0.019	0.0915	2.62 ± 0.35	0.0275
$[\text{C}_5\text{mim}]\text{Br}$	0.9200	0.12 ± 0.06	0.0716	0.67 ± 0.07	0.0084
$X_{\text{NTf}_2} = 0.25$	0.9355	0.41 ± 0.06	0.0150	4.96 ± 0.41	0.0495
$X_{\text{NTf}_2} = 0.50$	0.9492	0.28 ± 0.02	0.0095	4.32 ± 0.77	0.0413
$X_{\text{NTf}_2} = 0.75$	0.9352	0.26 ± 0.03	0.0542	3.79 ± 0.23	0.0106

Nondiffusive
dynamics

diffusive
dynamics



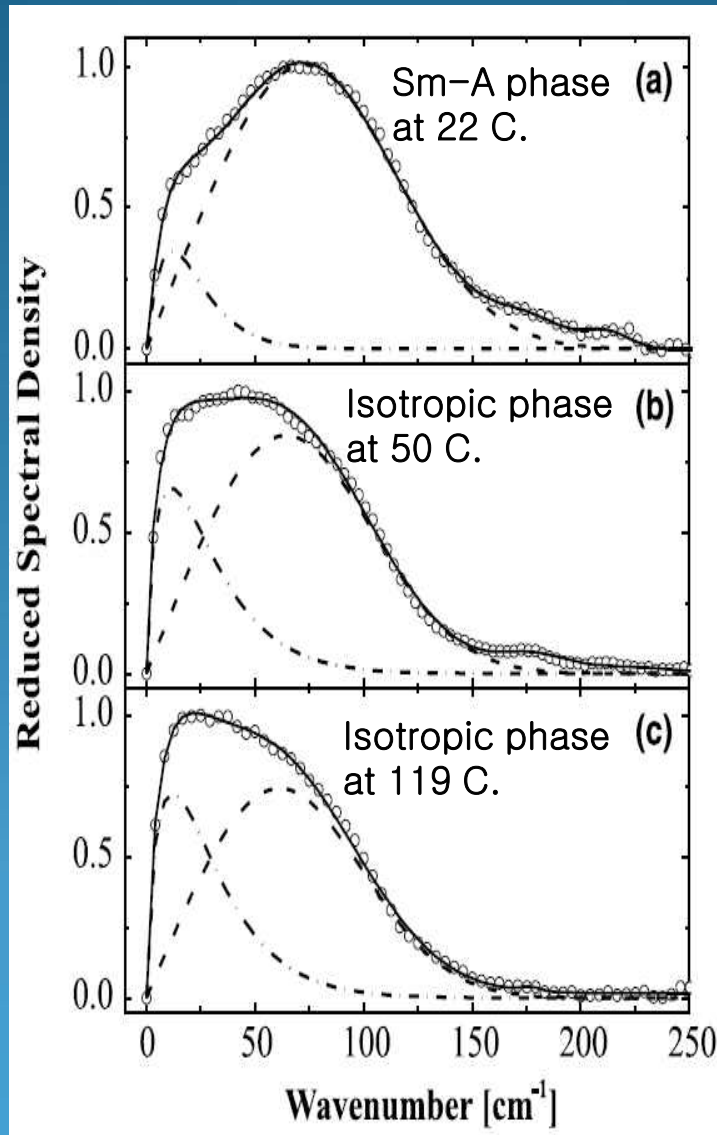
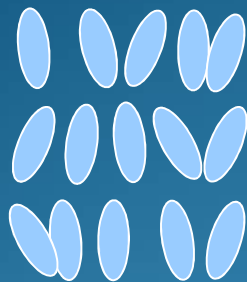
- Reduced spectral densities of (a) $[C_5mim]Br$ and (b) $[C_5mim][NTf_2]$ at 295K.
- The solid red curves are the multicomponent fits of the reduced spectral densities.
- The component bands obtained in the multicomponent analysis of the reduced spectral densities are also shown.



$$I_{\text{mix}}^0(\omega) = N[x_{\text{NTf}_2} I_{\text{NTf}_2}(\omega) + (1 - x_{\text{NTf}_2}) I_{\text{Br}}(\omega)]$$

- Experimentally measured and calculated reduced spectral densities of binary mixtures of $[\text{C}_5\text{mim}][\text{NTf}_2]$ and $[\text{C}_5\text{mim}]\text{Br}$ corresponding to $x_{\text{NTf}_2} =$ (a) 0.25, (b) 0.50, and (c) 0.75.
- The calculated reduced spectral densities were obtained from the mole-fraction weighted sums of reduced spectral densities for the neat ionic liquids.

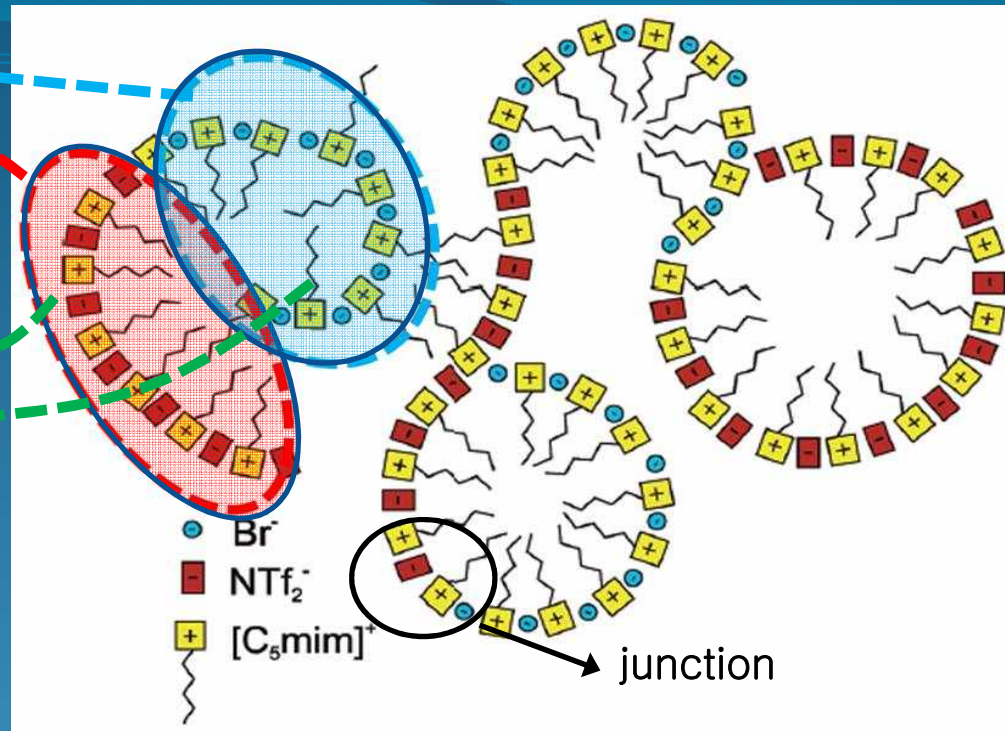
- Liquid crystal (8CB) Kerr signal
(obtained by applying the Fourier-transform procedure to the reduced Response)



*Broadened !!!
; locally ordered*

Locally
ordered
domains

Block



- Assume :

- (1)The existence of *locally ordered domains* in the neat RTILs

- (2)The structures of these locally ordered domains are *preserved upon mixing*.

- locally ordered domains :

- characterized by a set of normal-mode frequencies corresponding to the collective translational and rotational motion of the ions within the domain.

Block copolymers :

comprise two or more homopolymer subunits linked by covalent bonds .

The union of the homopolymer subunits may require an intermediate non-repeating subunit, known as a junction block. Block copolymers with two or three distinct blocks are called diblock copolymers and triblock copolymers, respectively.

