SIT_1: Details of the parameters of Eq. 2 for various relaxation processes shown in SIF_2 (in CHXOL + CHPOL, $x_m = 0.25$).

Processes	Temp (K)	α_{HN}	β_{HN}	f_0 (Hz)	f_m(Hz)	$\Delta\varepsilon$
α - process	152.8	0.066	0.733	1.28×10^{-2}	1.68×10^{-2}	19.71
	165.1	0.047	0.689	1.77×10^{0}	2.42×10^{0}	19.85
	180.8	0.074	0.718	1.02×10^{2}	1.39×10^{2}	20.23
	199.9	0.032	0.711	2.27×10^{3}	3.02×10^{3}	19.21
	224.8	0.021	0.737	4.93×10^{4}	6.31×10^{4}	18.35
	240.2	0.008	0.714	2.21×10^{5}	2.89×10^{5}	18.03
	260.5	0.000	0.714	1.33×10^{6}	1.73×10^{6}	17.19
β- process	152.8	0.555	1.00	3.31×10^{1}	3.31×10^{1}	0.582
	158.4	0.507	1.00	9.55×10^{1}	9.55×10^{1}	0.501
γ - process	100.7	0.840	1.00	1.39×10^{1}	1.39×10^{1}	0.2499
	105.9	0.828	1.00	1.27×10^{2}	1.27×10^{2}	0.2510
	110.6	0.817	1.00	5.68×10^{2}	5.68×10^{2}	0.2562
	115.0	0.797	1.00	2.65×10^{3}	2.65×10^{3}	0.2516
	120.3	0.764	1.00	1.59×10^{4}	1.59×10^{4}	0.2342
	125.2	0.752	1.00	5.18×10^{4}	5.18×10^{4}	0.2434
	130.5	0.728	1.00	1.35×10^{5}	1.35×10^{5}	0.2977

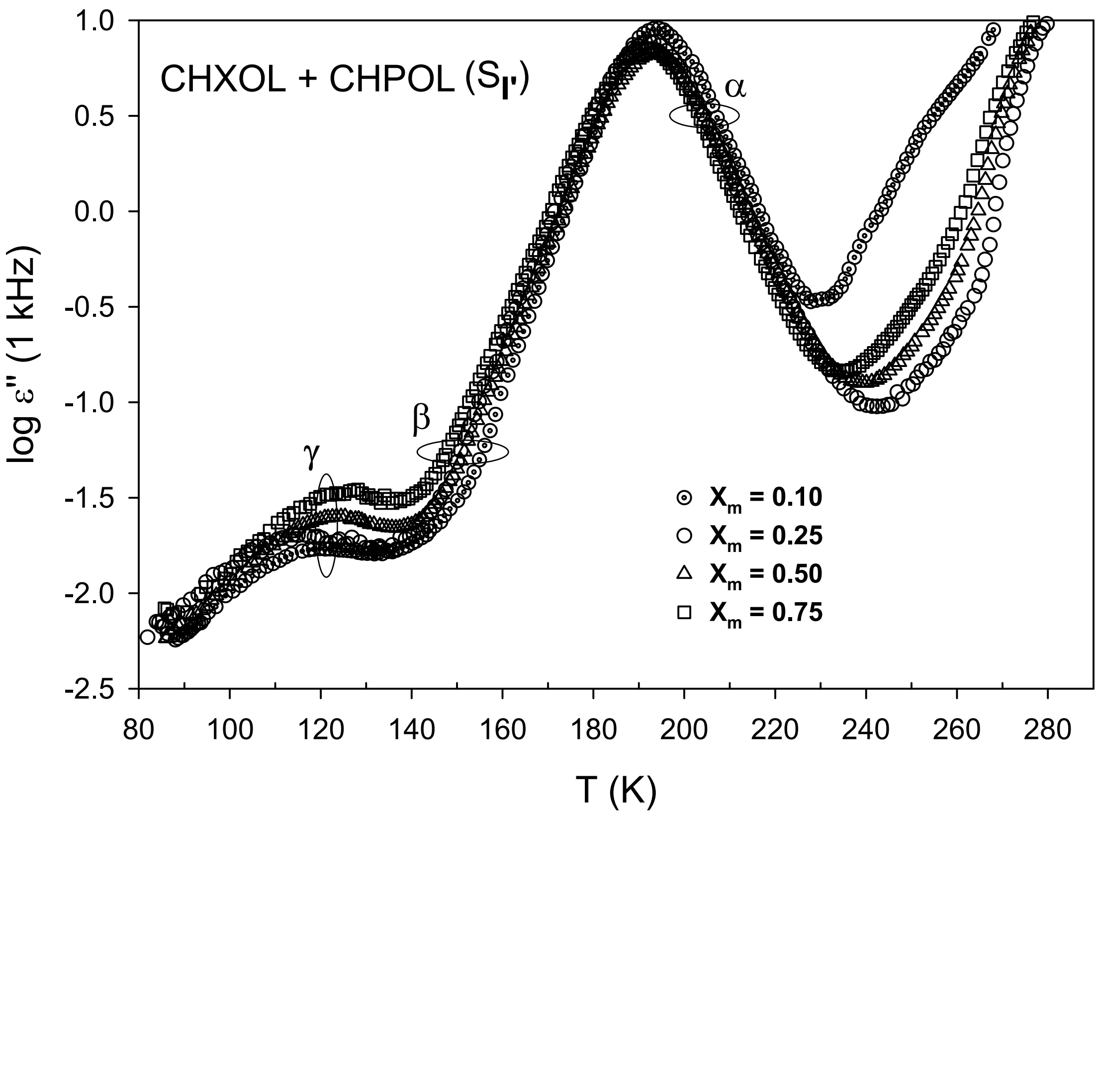
SIT$_2$: Details of the parameters of Eq. 2 for the fits shown in SIF$_6$ (in NPOL + NPGOL, x_m = 0.13).

Processes	Temp (K)	α_{HN}	β_{HN}	f_0 (Hz)	f_m(Hz)	Δε
α - process	156.5	0.152	0.830	4.81×10^{-2}	5.80×10^{-1}	6.32
	168.8	0.163	0.855	2.50×10^{2}	2.92×10^{0}	8.33
	187.7	0.132	0.799	9.10×10^{1}	1.12×10^{2}	10.47
	200.4	0.104	0.783	3.18×10^{3}	3.99×10^{3}	10.50
	224.9	0.049	0.714	9.38×10^{4}	1.24×10^{5}	10.05
	235.4	0.021	0.604	2.92×10^{5}	4.39×10^{5}	10.27
β - process	156.5	0.631	1.00	2.65×10^{1}	2.65×10^{1}	0.220
γ - process	105.4	0.658	1.00	1.59×10^{4}	1.59×10^{4}	0.102
	110.5	0.621	1.00	5.20×10^{4}	5.19×10^{4}	0.101
	115.9	0.586	1.00	1.54×10^{5}	1.54×10^{5}	0.099
	120.2	0.563	1.00	3.19×10^{5}	3.18×10^{5}	0.099
	125.8	0.577	1.00	1.41×10^{6}	1.40×10^{6}	0.116

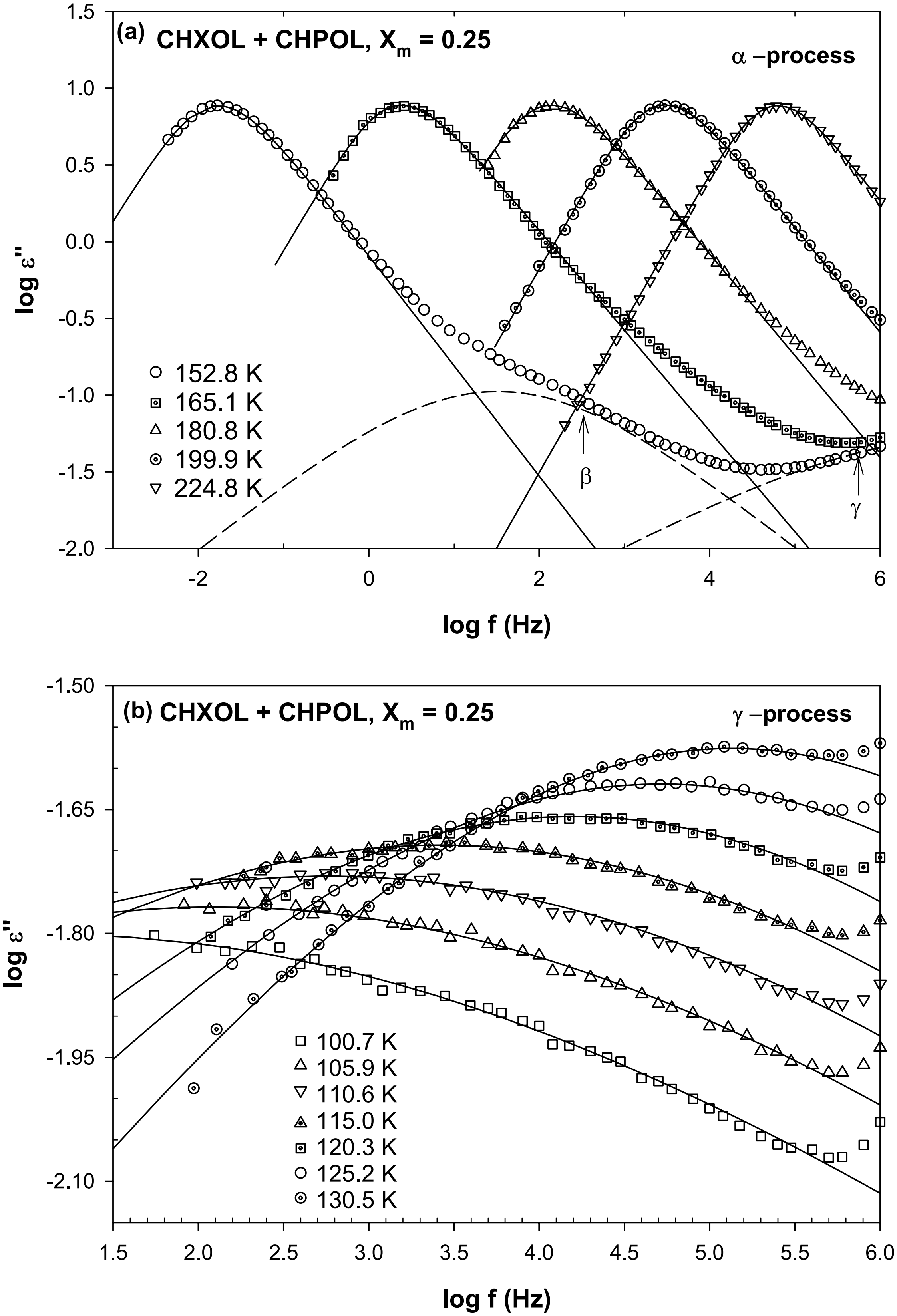
SIT$_3$. Details of parameters of Eq. 2 for the fits shown in SIF$_7$ (in CNCH + CHC, Xm = 0.125).

Process	Temp (K)	α_{HN}	β_{HN}	f_0 (Hz)	f_m (Hz)	$\Delta\varepsilon$
α'	185.6	0.406	0.943	5.55×10^{1}	6.07×10^{1}	1.565
	190.1	0.405	1.000	1.99×10^{2}	1.99×10^{2}	1.498
	195.2	0.355	1.000	5.90×10^{2}	5.90×10^{2}	1.355
	200.8	0.322	1.000	1.77×10^{3}	1.77×10^{3}	1.239
α	135.4	0.180	0.657	2.25×10^{-2}	3.49×10^{-2}	11.03
	150.5	0.140	0.586	2.76×10^{1}	4.66×10^{1}	11.51
	165.4	0.146	0.599	3.98×10^{3}	6.62×10^{3}	11.96
	185.6	0.045	0.388	1.75×10^{5}	3.92×10^{5}	12.56
	195.2	0.011	0.299	5.54×10^{5}	1.49×10^{6}	13.82
β	100.8	0.505	0.232	1.93×10^{1}	3.24×10^{2}	0.284
	105.5	0.634	0.350	5.17×10^{1}	8.48×10^{2}	0.336
	110.1	0.680	0.421	2.31×10^{2}	3.26×10^{3}	0.389
	115.1	0.705	0.501	1.14×10^{3}	1.14×10^{4}	0.422
	120.4	0.735	0.738	1.59×10^{4}	4.99×10^{4}	0.440
	125.0	0.759	1.000	1.67×10^{5}	1.67×10^{5}	0.481

SIF$_1$

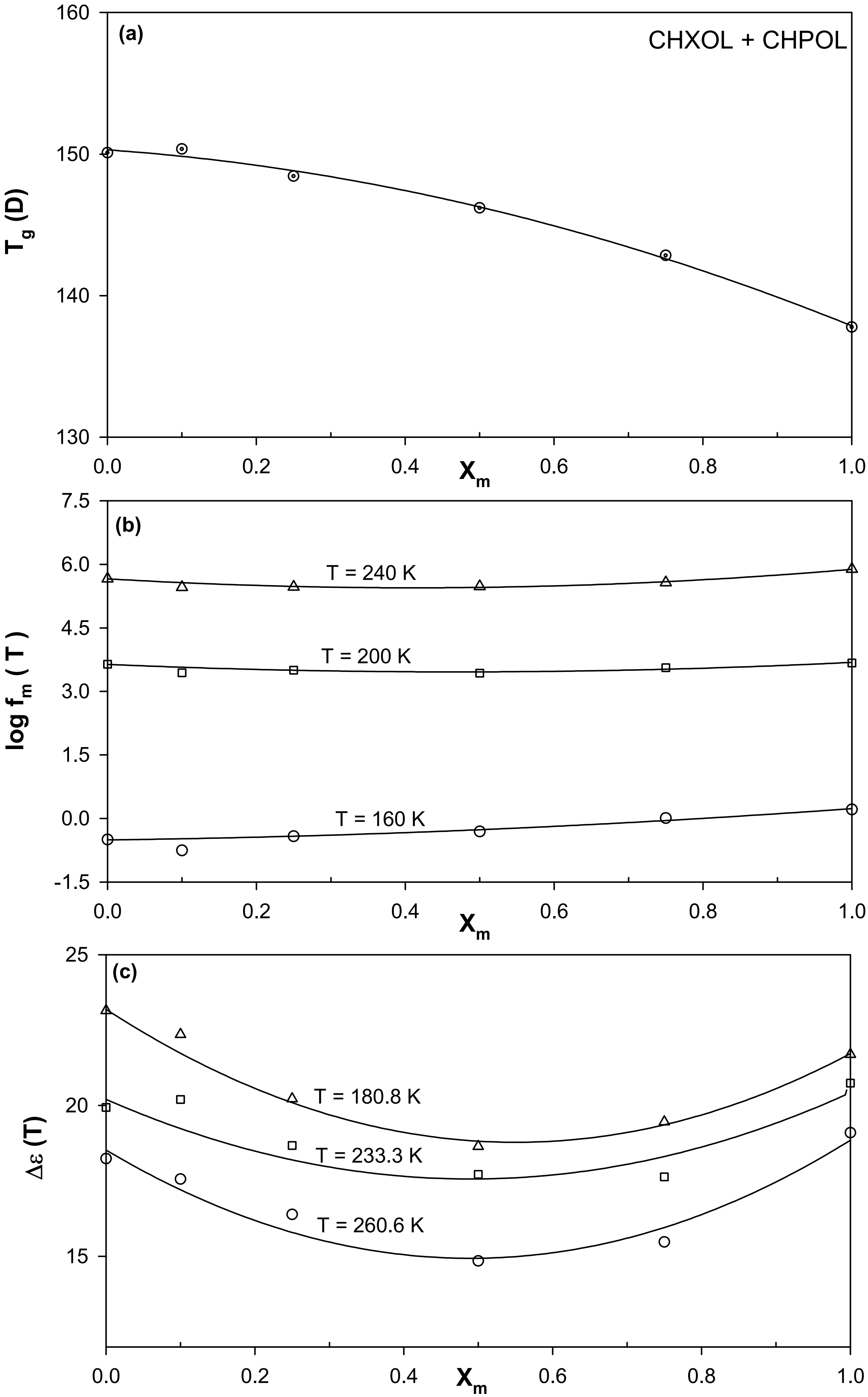

CHXOL + CHPOL (S$_{I'}$)
α
β
γ
X$_m$ = 0.10
X$_m$ = 0.25
X$_m$ = 0.50
X$_m$ = 0.75
log ε'' (1 kHz)
T (K)
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
80
100
120
140
160
180
200
220
240
260
280

SIF$_2$

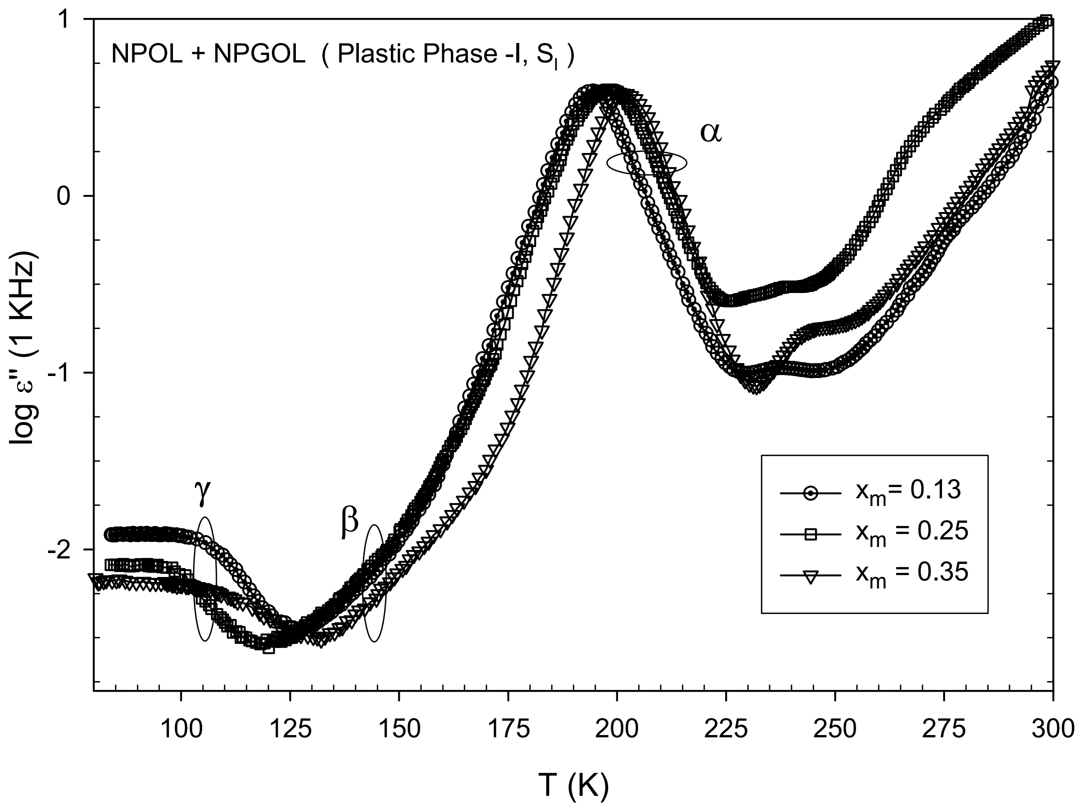


(a) CHXOL + CHPOL, X$_m$ = 0.25
α −process
β
γ
152.8 K
165.1 K
180.8 K
199.9 K
224.8 K
log ε"
log f (Hz)
(b) CHXOL + CHPOL, X$_m$ = 0.25
γ −process
100.7 K
105.9 K
110.6 K
115.0 K
120.3 K
125.2 K
130.5 K
log ε"
log f (Hz)

SIF$_3$

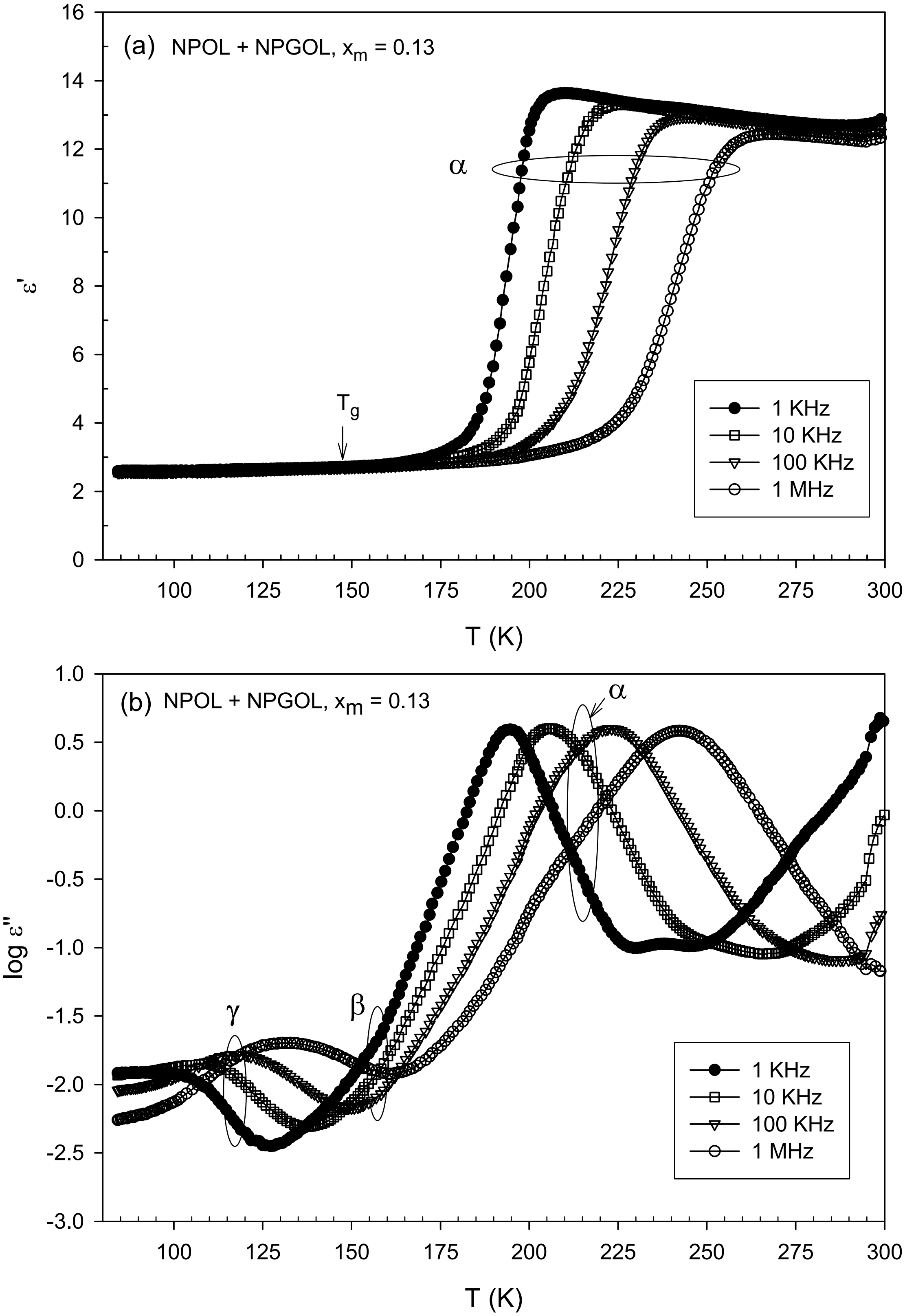

(a)
CHXOL + CHPOL
T_g (D)
160
150
140
130
0.0
0.2
0.4
0.6
0.8
1.0
X_m
(b)
T = 240 K
T = 200 K
T = 160 K
log f_m (T)
7.5
6.0
4.5
3.0
1.5
0.0
-1.5
(c)
T = 180.8 K
T = 233.3 K
T = 260.6 K
Δε (T)
25
20
15

SIF$_4$



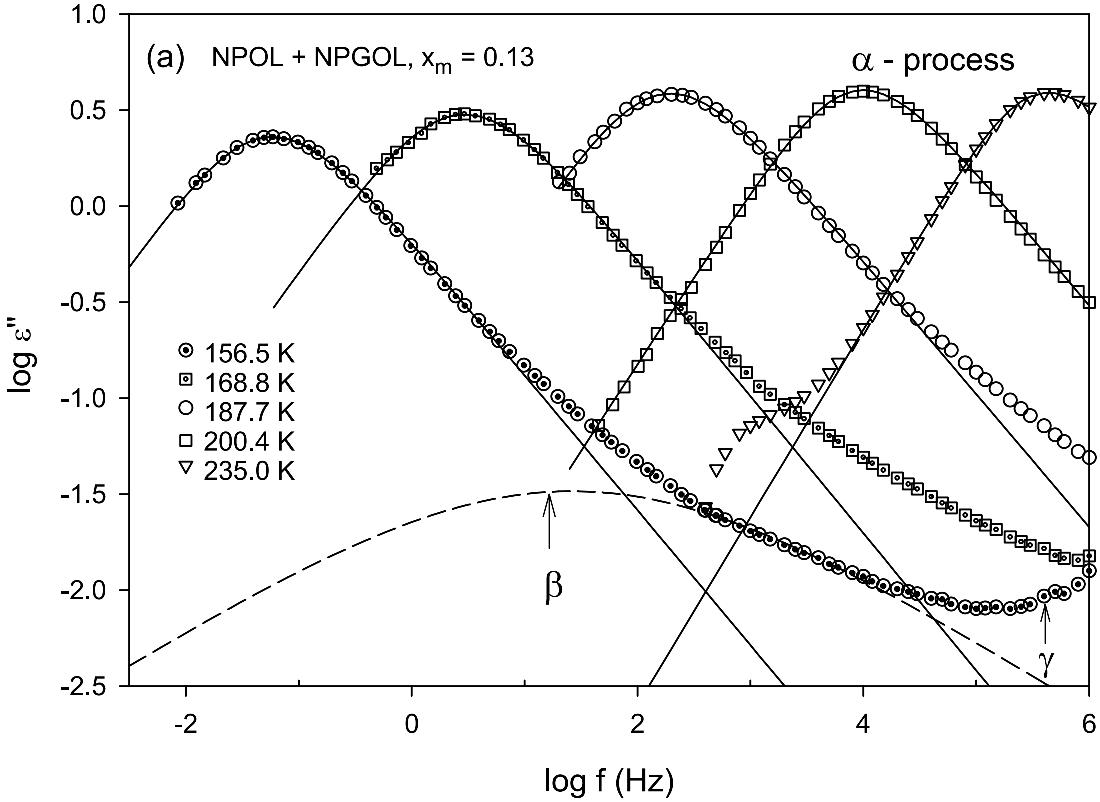
NPOL + NPGOL (Plastic Phase -I, S$_I$)
α
β
γ
x_m= 0.13
x_m = 0.25
x_m = 0.35
log ε'' (1 KHz)
T (K)
1
0
-1
-2
100
125
150
175
200
225
250
275
300

SIF$_5$

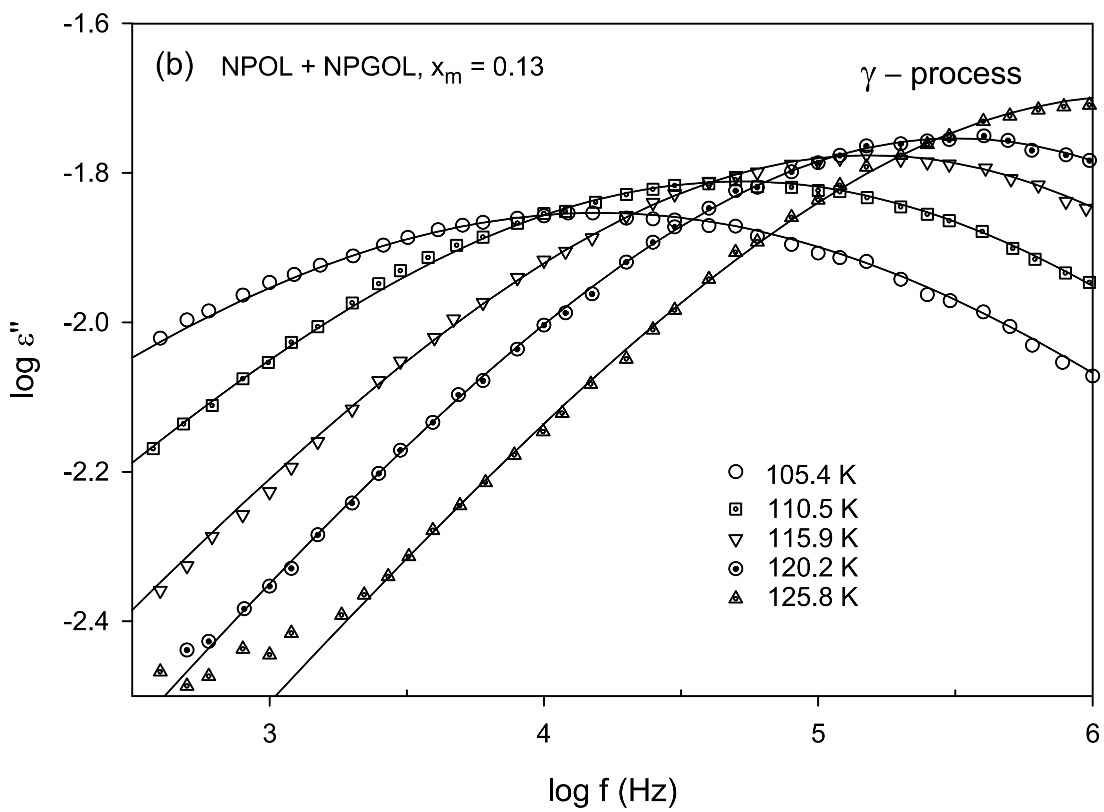


(a) NPOL + NPGOL, x_m = 0.13
α
T_g
ε'
T (K)
1 KHz
10 KHz
100 KHz
1 MHz
(b) NPOL + NPGOL, x_m = 0.13
α
β
γ
log ε''
T (K)
1 KHz
10 KHz
100 KHz
1 MHz

SIF$_6$

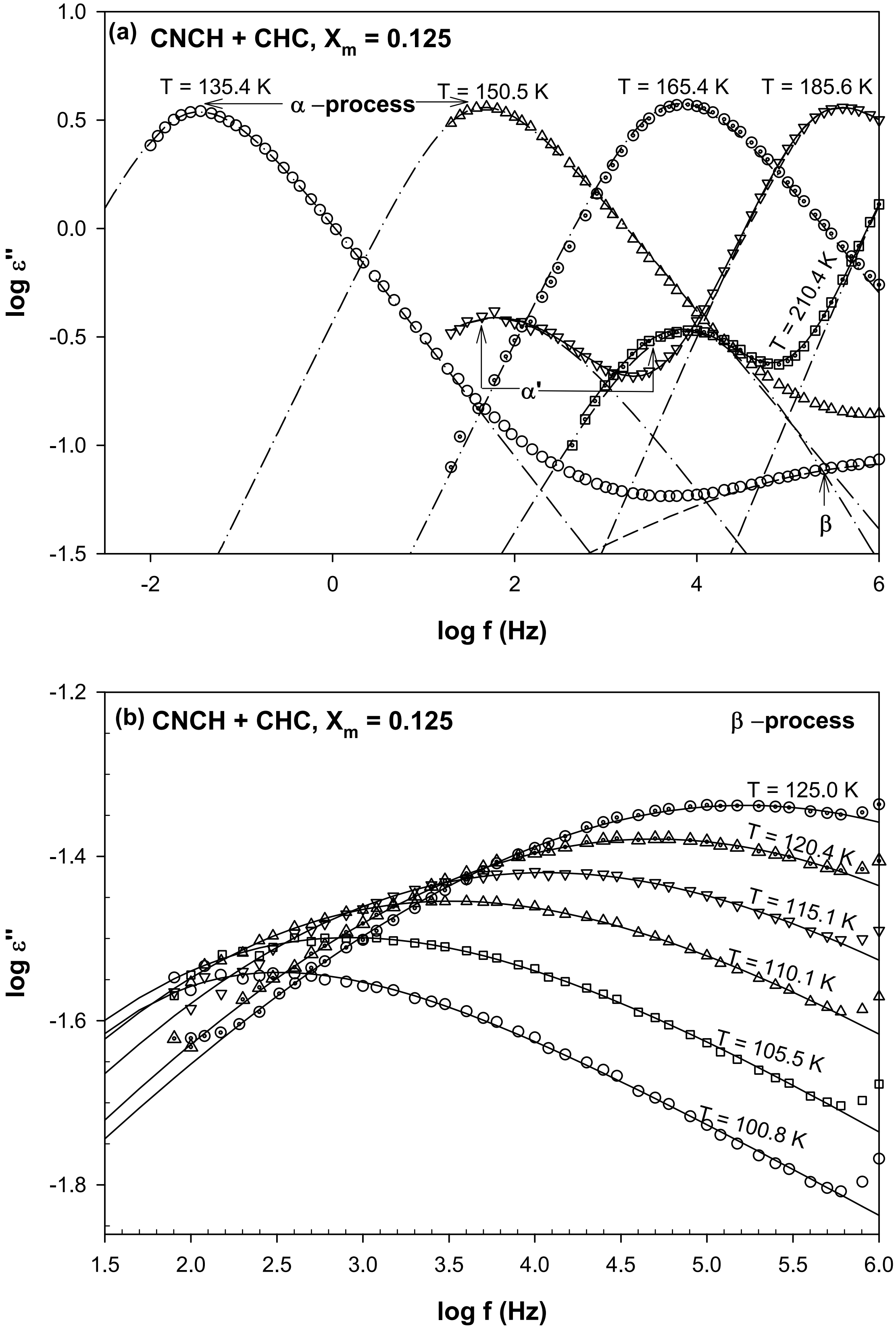


(a) NPOL + NPGOL, x$_m$ = 0.13
α - process
156.5 K
168.8 K
187.7 K
200.4 K
235.0 K
β
γ
log ε''
log f (Hz)



(b) NPOL + NPGOL, x$_m$ = 0.13
γ – process
105.4 K
110.5 K
115.9 K
120.2 K
125.8 K
log ε''
log f (Hz)

SIF_7



(a) CNCH + CHC, Xm = 0.125
T = 135.4 K
α −process
T = 150.5 K
T = 165.4 K
T = 185.6 K
T = 210.4 K
α'
β
log ε"
log f (Hz)
(b) CNCH + CHC, Xm = 0.125
β −process
T = 125.0 K
T = 120.4 K
T = 115.1 K
T = 110.1 K
T = 105.5 K
T = 100.8 K
log ε"
log f (Hz)

Supplementary Figure Captions

SIF_1. CHXOL + CHPOL binary system: Variation of log ε'' with temperature at a test frequency of 1 kHz, for different concentrations of CHPOL. Note that the presence of a smaller process designated as β– process along with the α- and γ- processes. It may be noted that the α′-process present[38] in pure CHXOL is not resolvable in this binary system.

SIF_2. Double logarithmic plot of ε'' vs. frequency at different temperatures for various relaxation processes of CHXOL + CHPOL binary system with $x_m = 0.25$. (a) α -, & β- process (b) γ-process. The solid line corresponds to the HN- equation (2) for the α- process, dashed line corresponds to the CC-fit for the resolved β-process in panel (a) and solid line corresponds to the CC-fit for β-process in panel (b). The rise in the loss at frequencies above 10 kHz in (a) is due to the β-process. The parameters of eq. 2 for the α - & γ-processes are given in supplementary Table (SIT_1).

SIF_3. Variation of various physical parameters of CHXOL + CHPOL binary system with mole fraction (x_m) of second component i .e. CHPOL: (a) $T_g(D)$, [where $T_g(D)$ is the temperature at which the f_m value is 10^{-3} Hz]; (b) log f_m & (c) dielectric strength ($\Delta\varepsilon$) at three fixed temperatures. The thick lines are fits to eq. 5.

SIF_4 . NPOL + NPGOL binary system: Variation of log ε'' with temperature at a test frequency of 1 kHz, for different concentrations of NPGOL. Note that the presence of a smaller process designated as β- process along with the α- and γ- processes.

SIF_5. Behavior of NPOL + NPGOL binary system for $x_m = 0.13$. Temperature variation of the (a) real and (b) imaginary parts of the complex permittivity at various test frequencies. The phase designated as S_I is the solid solution.

SIF_6. Double logarithmic plot of ε'' vs. frequency at different temperatures for various relaxation processes of NPOL + NPGOL binary system with $x_m = 0.13$. (a) α-, & β-process (b) γ-process. The solid line corresponds to the HN- equation (2) for the α-process, dashed line corresponds to the CC-fit for the resolved β-process in panel (a) and solid line corresponds to the CC-fit for γ-process in panel (b). The rise in the loss at frequencies above 10 kHz in (a) is due to the γ-process. The parameters of eq. 2 for the α- & γ-processes are given in SIT_2.

SIF_7. Double logarithmic plot of ε'' vs. frequency of CNCH + CHC binary system for different temperatures with $x_m = 0.125$: (a) α- process and (b) β- process. The dashed dotted line in panel (a) and solid line in panel (b) corresponds to the HN-parameters shown in SIT_3. For T = 185.6 K, the solid line represents the typical ansatz (HN + CC) fit to resolve the α′- and α- processes.