Supplementary material

FIGURE CAPTIONS FOR SUPPLEMENTARY SECTION

Fig. S1. Experimental photographs during the preparation process of composite membranes: a) SPEEK-PVB nanofiber mat obtained after of electrospinning process, b) Crosslinked SPEEK-PVB nanofiber mat obtained after of crosslinking process at 180°C, c) Final aspect of a SPEEK-PVB mat embedded in SPEEK-PVA polymer solution to obtain a composite membrane after of final crosslinking process.

Fig. S2. Bode diagram for the M-02 SPEEK-PVB-PVA composite membrane at several temperatures: 20, 40, 60, 80, 100, 120 and 140°C. The inset show the Nyquist plot for the same membrane.

Fig. S3. Bode diagram for the M-04 SPEEK-PVB-PVA composite membrane at several temperatures: 20, 40, 60, 80, 100, 120 and 140°C. The inset show the Nyquist plot for the same membrane.

Fig. S4. Bode diagram for the M-06 SPEEK-PVB-PVA composite membrane at several temperatures: 20, 40, 60, 80, 100, 120 and 140°C. The inset show the Nyquist plot for the same membrane.

Fig. S5. Bode diagram for the M-08 SPEEK-PVB-PVA composite membrane at several temperatures: 20, 40, 60, 80, 100, 120 and 140°C. The inset show the Nyquist plot for the same membrane.

Fig. S6. Bode diagram for the M-10 SPEEK-PVB-PVA composite membrane at several temperatures: 20, 40, 60, 80, 100, 120 and 140°C. The inset show the Nyquist plot for the same membrane.

Fig. S7. Bode diagram for the M-14 SPEEK-PVB-PVA composite membrane at several temperatures: 20, 40, 60, 80, 100, 120 and 140°C. The inset show the Nyquist plot for the same membrane.

Fig. S8. Bode diagram for the $SPEEK_{65}$-PVA_{35} pure membrane at several temperatures: 20, 40, 60, 80, 100, 120 and 140°C. The inset show the Nyquist plot for the same membrane.

Fig. S9. Double logarithmic plot of the imaginary permittivity ε" *versus* the frequency for the sample M-02 at several temperatures 20, 40, 60, 80, 100, 120 and 140°C.

Fig. S10. Double logarithmic plot of the imaginary permittivity ε" *versus* the frequency for the sample M-06 at several temperatures 20, 40, 60, 80, 100, 120 and 140°C.

Fig. S11. Double logarithmic plot of the imaginary permittivity ε" *versus* the frequency for the sample M-08 at several temperatures 20, 40, 60, 80, 100, 120 and 140°C.

Fig. S12. Double logarithmic plot of the imaginary permittivity ε" *versus* the frequency for the sample M-10 at several temperatures 20, 40, 60, 80, 100, 120 and 140°C.

Fig. S13. Double logarithmic plot of the imaginary permittivity ε" *versus* the frequency for the sample M-12 at several temperatures 20, 40, 60, 80, 100, 120 and 140°C.

Fig. S14. Double logarithmic plot of the imaginary permittivity ε" *versus* the frequency for the sample M-14 at several temperatures 20, 40, 60, 80, 100, 120 and 140°C.

Fig. S15. Double logarithmic plot of the imaginary permittivity ε" *versus* the frequency for the sample $SPEEK_{65}$-PVA_{35} pure membrane at several temperatures 20, 40, 60, 80, 100, 120 and 140°C.

Figure S1.

Figure S2.

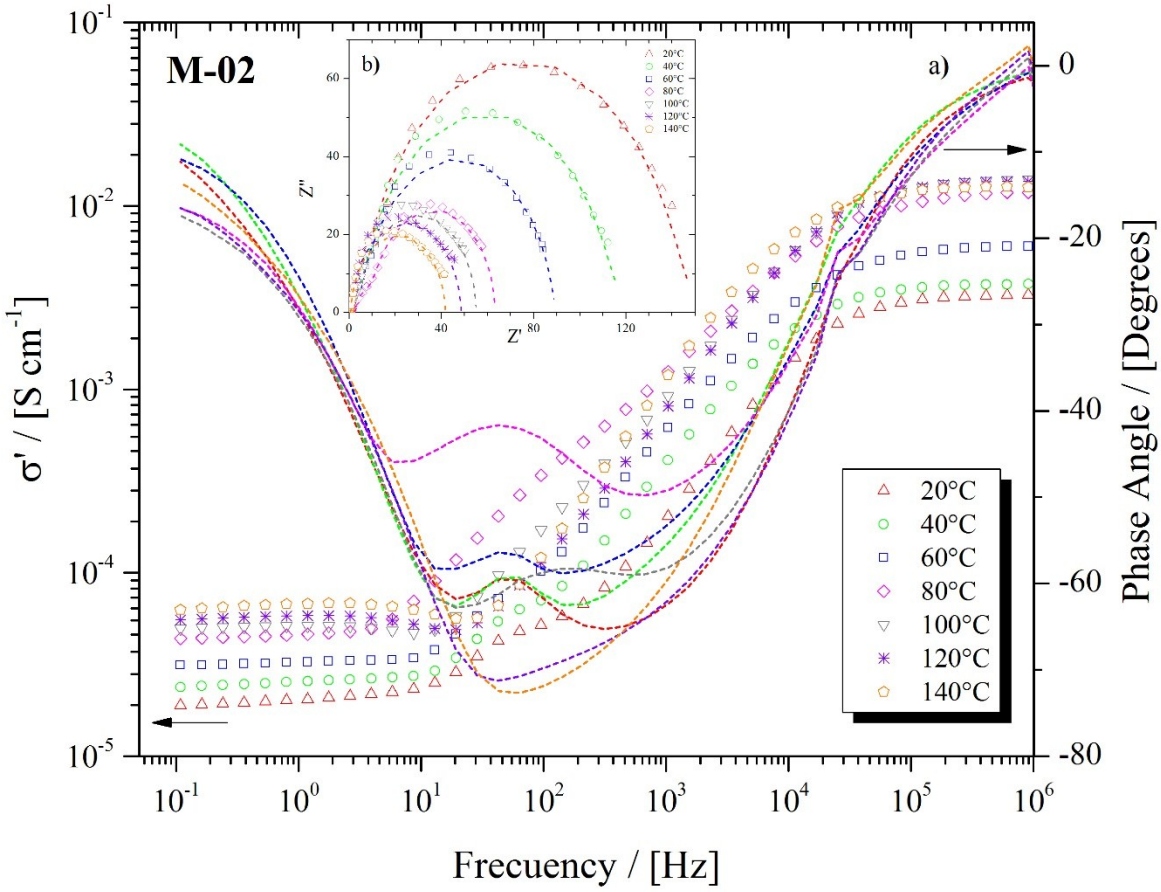
M-02
a)
b)
σ' / [S cm-1]
Phase Angle / [Degrees]
Frecuency / [Hz]
Z'
Z''
20°C
40°C
60°C
80°C
100°C
120°C
140°C

Figure S3.

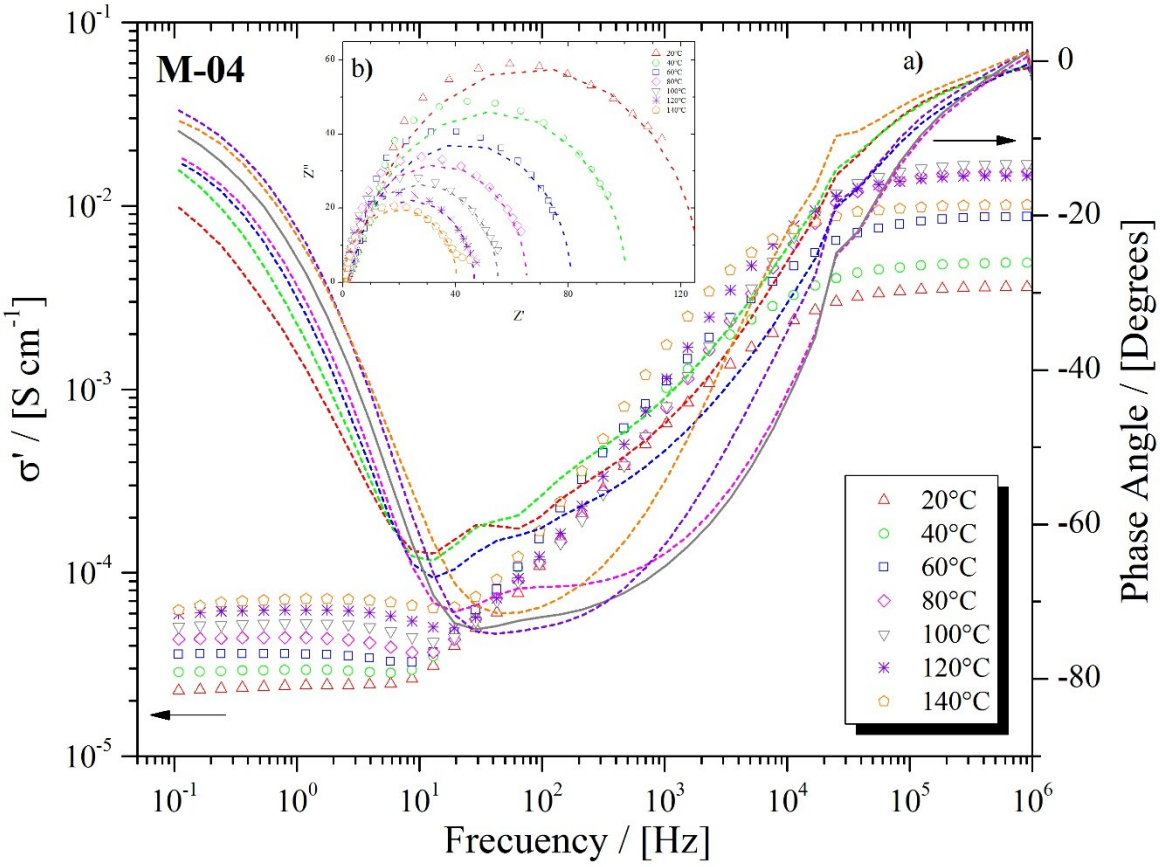
M-04
a)
b)
σ' / [S cm-1]
Phase Angle / [Degrees]
Frecuency / [Hz]
Z'
Z''
20°C
40°C
60°C
80°C
100°C
120°C
140°C

Figure S4.

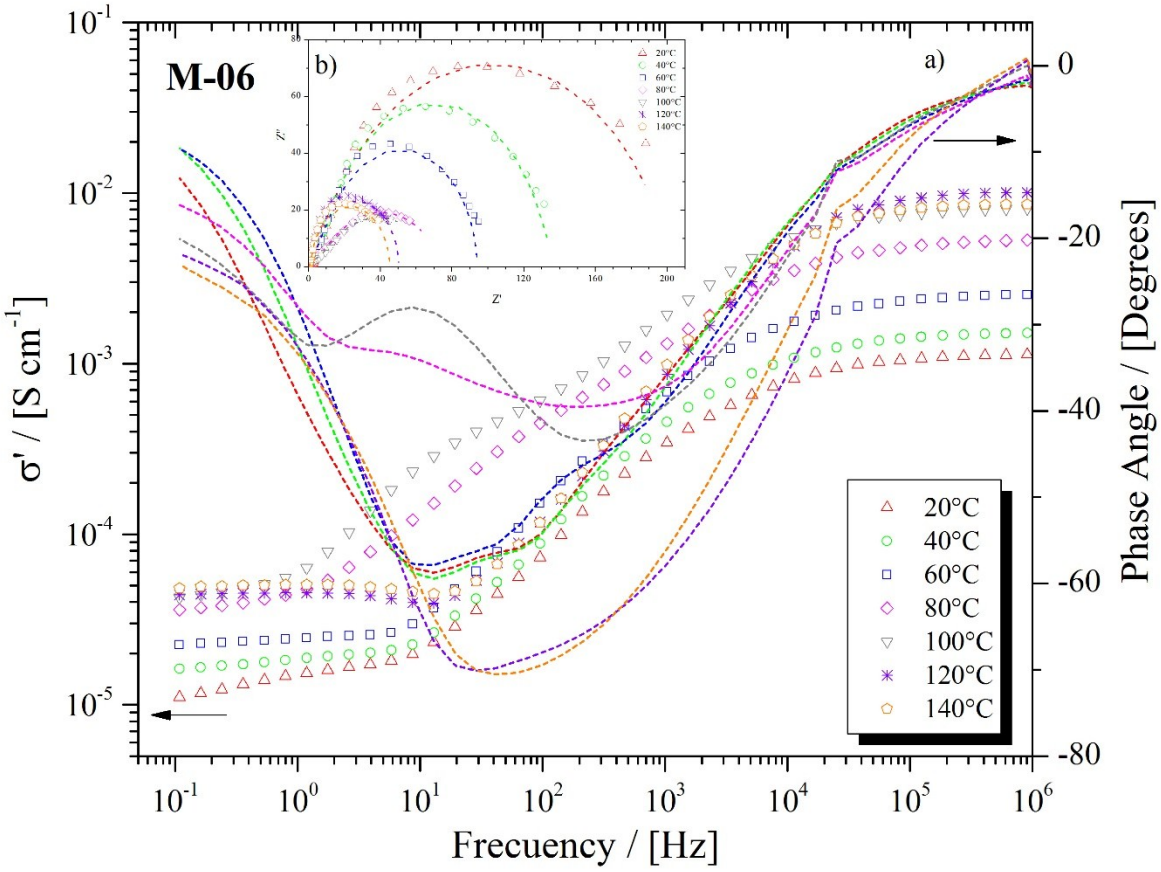
M-06
a)
b)
σ' / [S cm-1]
Phase Angle / [Degrees]
Frecuency / [Hz]
Z'
Z''
20°C
40°C
60°C
80°C
100°C
120°C
140°C

Figure S5.

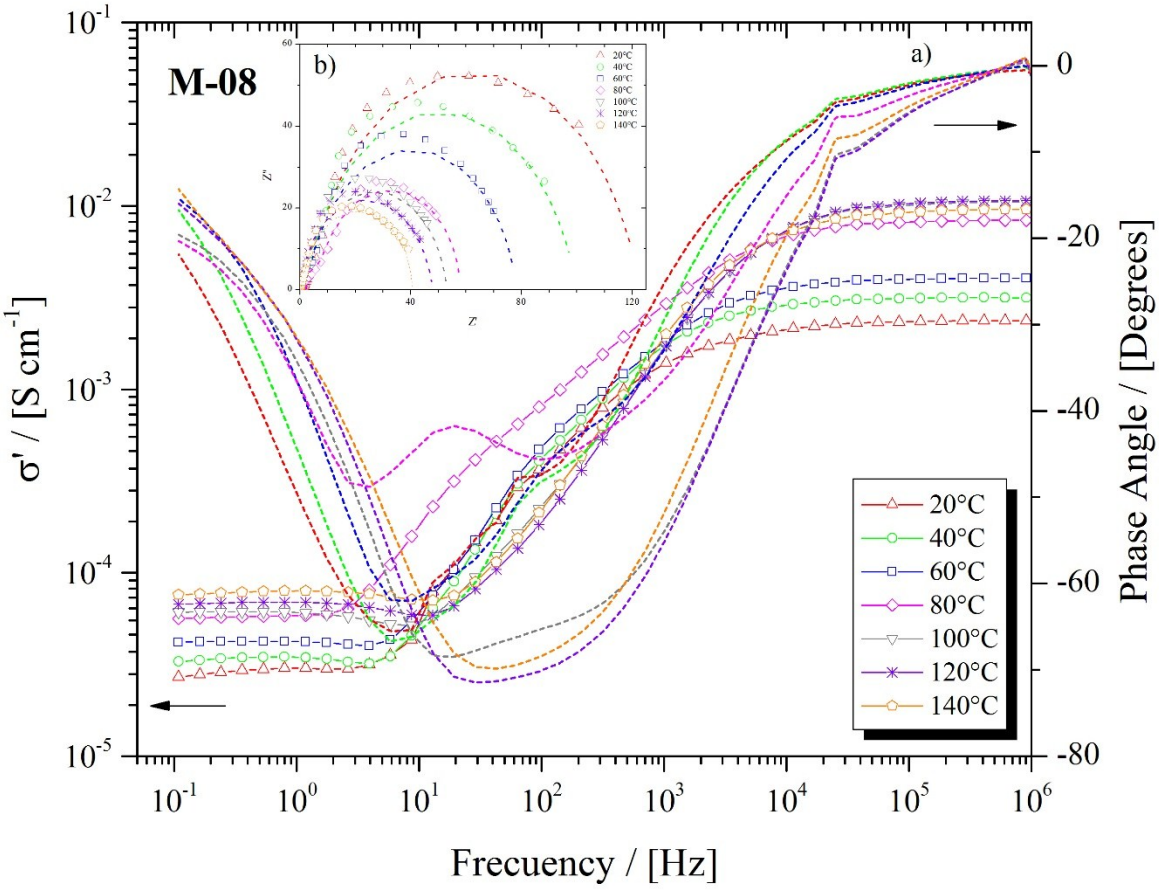
M-08
a)
b)
σ' / [S cm-1]
Phase Angle / [Degrees]
Frecuency / [Hz]
20°C
40°C
60°C
80°C
100°C
120°C
140°C
Z'
Z''

Figure S6.

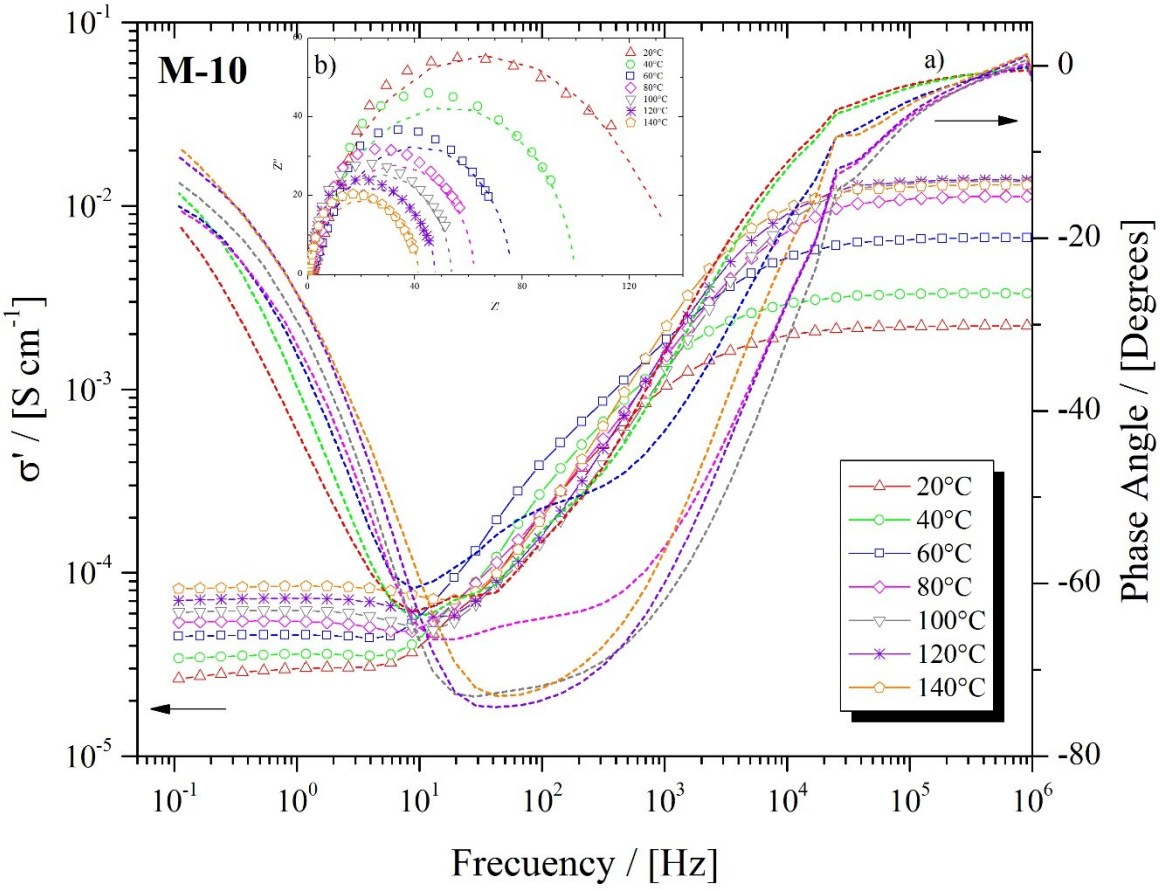
M-10
a)
b)
σ' / [S cm-1]
Phase Angle / [Degrees]
Frecuency / [Hz]
20°C
40°C
60°C
80°C
100°C
120°C
140°C
Z'
Z''

Figure S7.

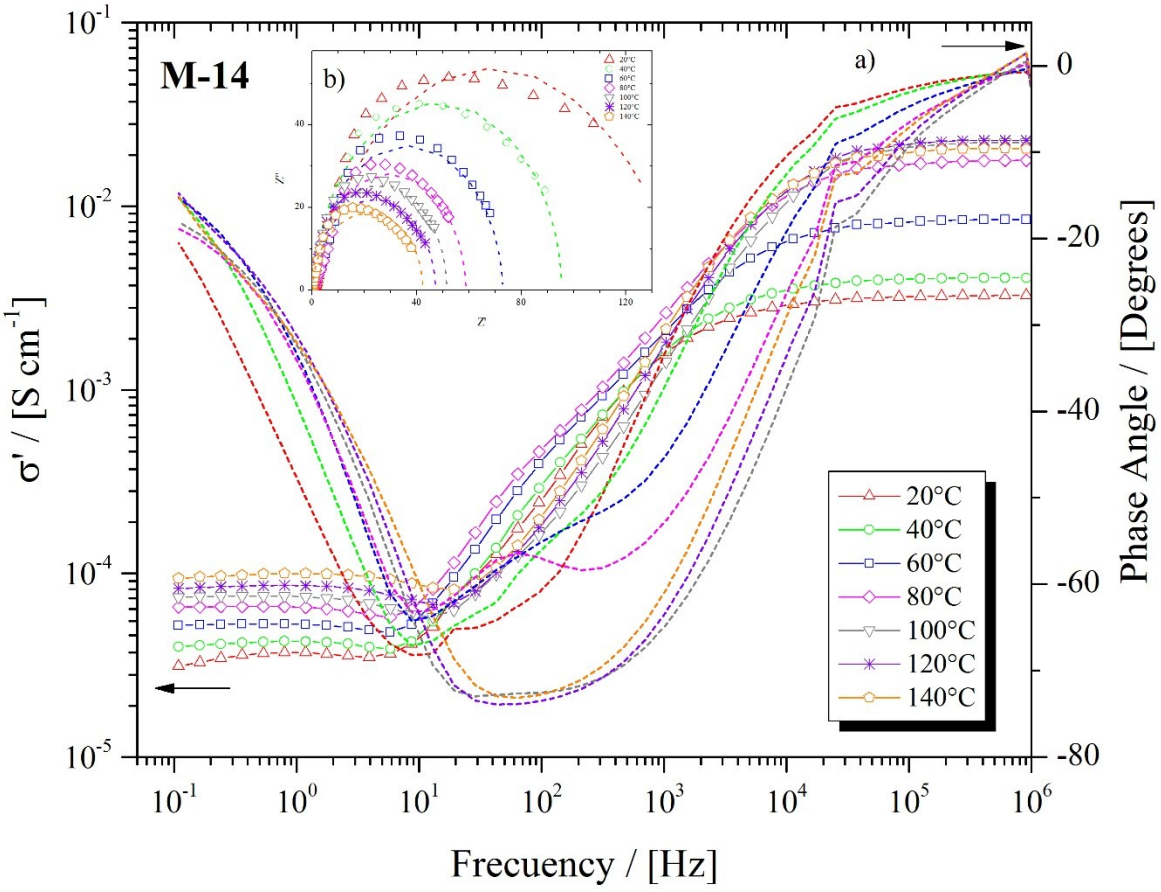
M-14
a)
b)
σ' / [S cm-1]
Phase Angle / [Degrees]
Frecuency / [Hz]
20°C
40°C
60°C
80°C
100°C
120°C
140°C
Z'
Z''

Figure S8.

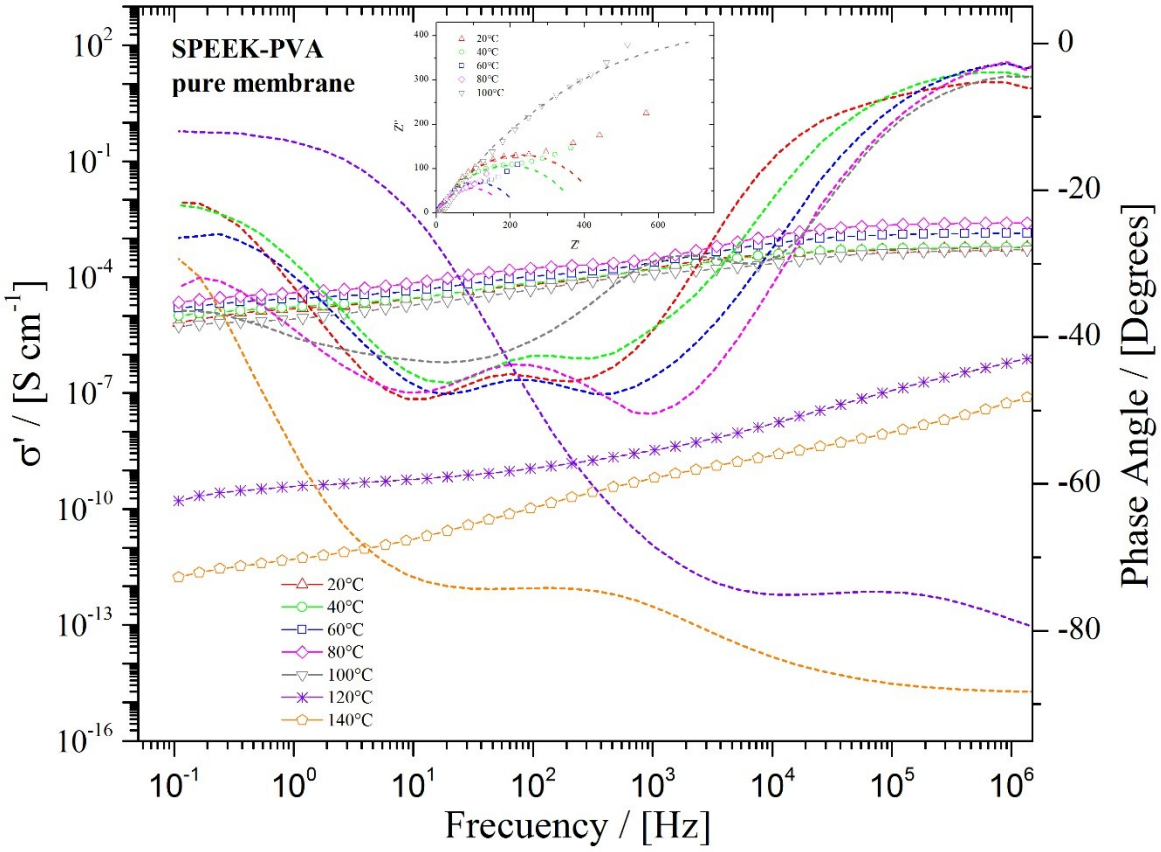
SPEEK-PVA
pure membrane
σ' / [S cm-1]
Phase Angle / [Degrees]
Frecuency / [Hz]
20°C
40°C
60°C
80°C
100°C
120°C
140°C
Z'
Z''

Figure S9.

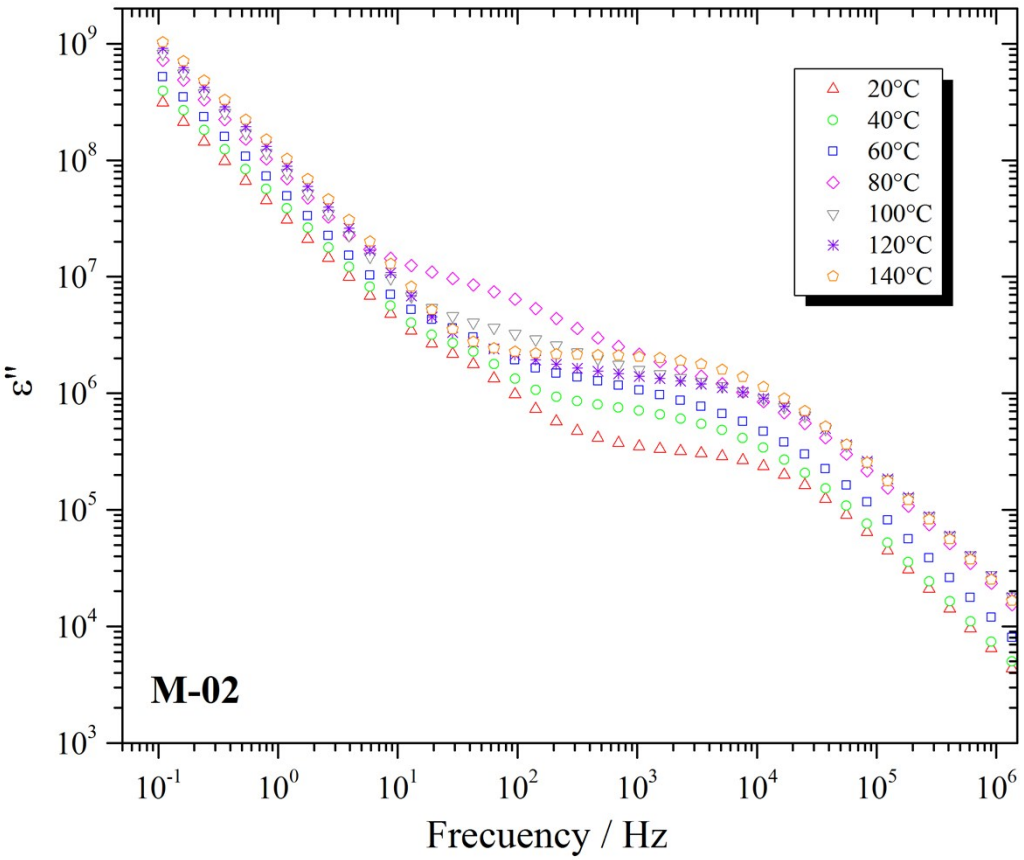

Figure S10.

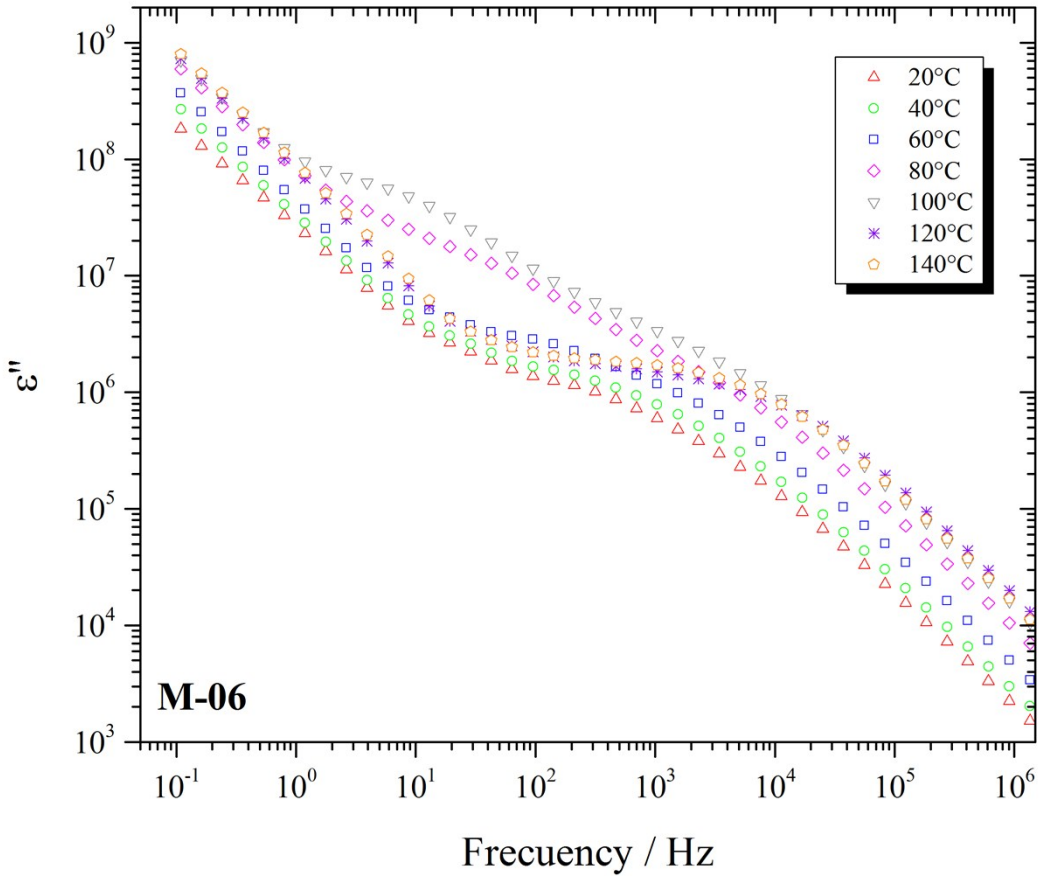

Figure S11.

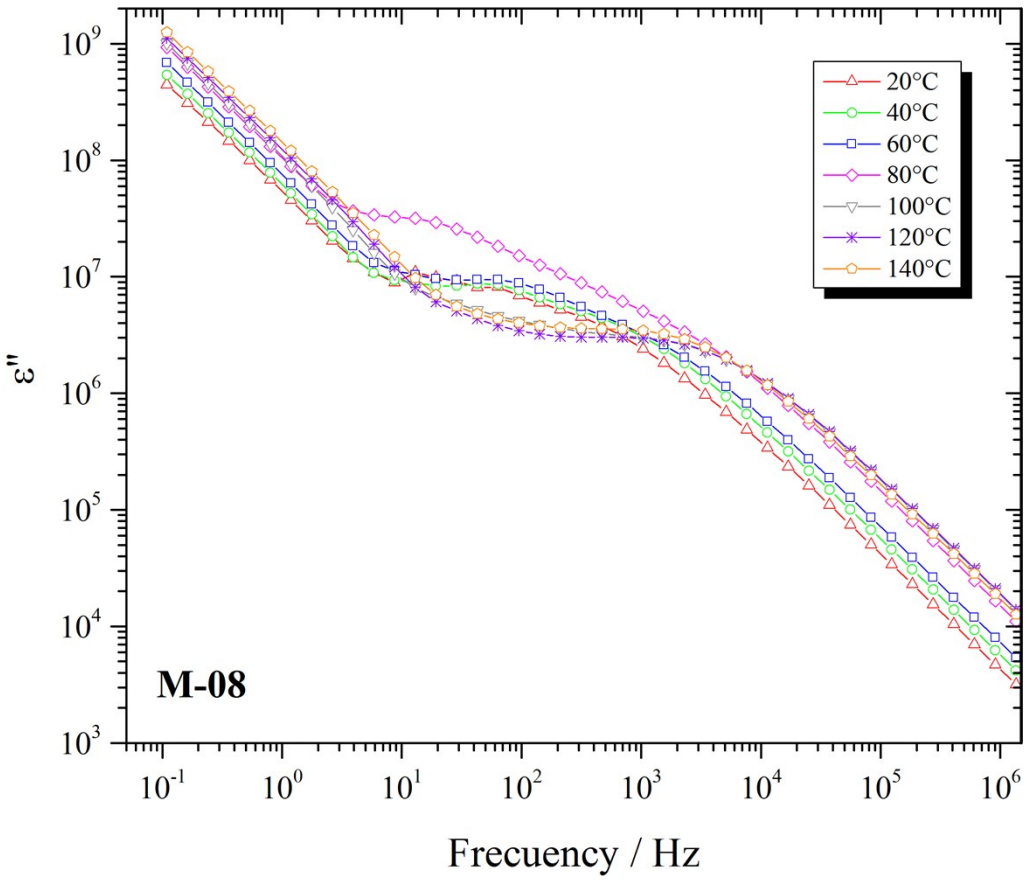

Figure S12.

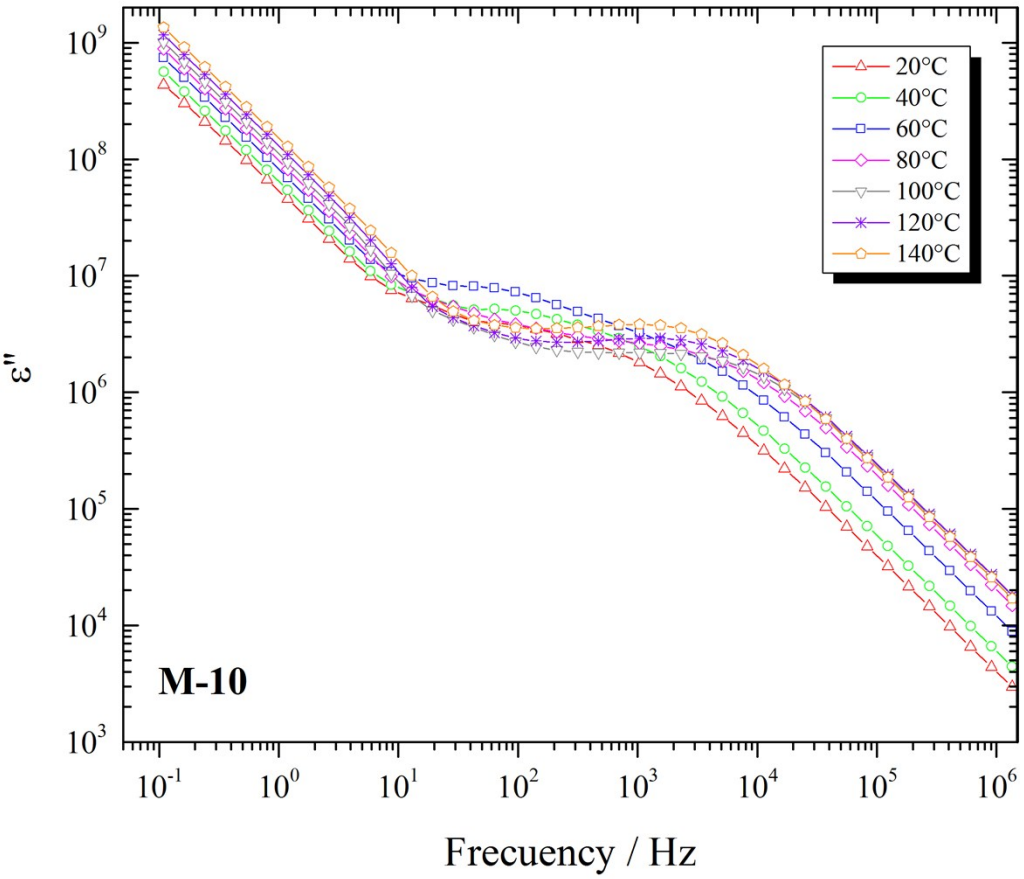

Figure S13.

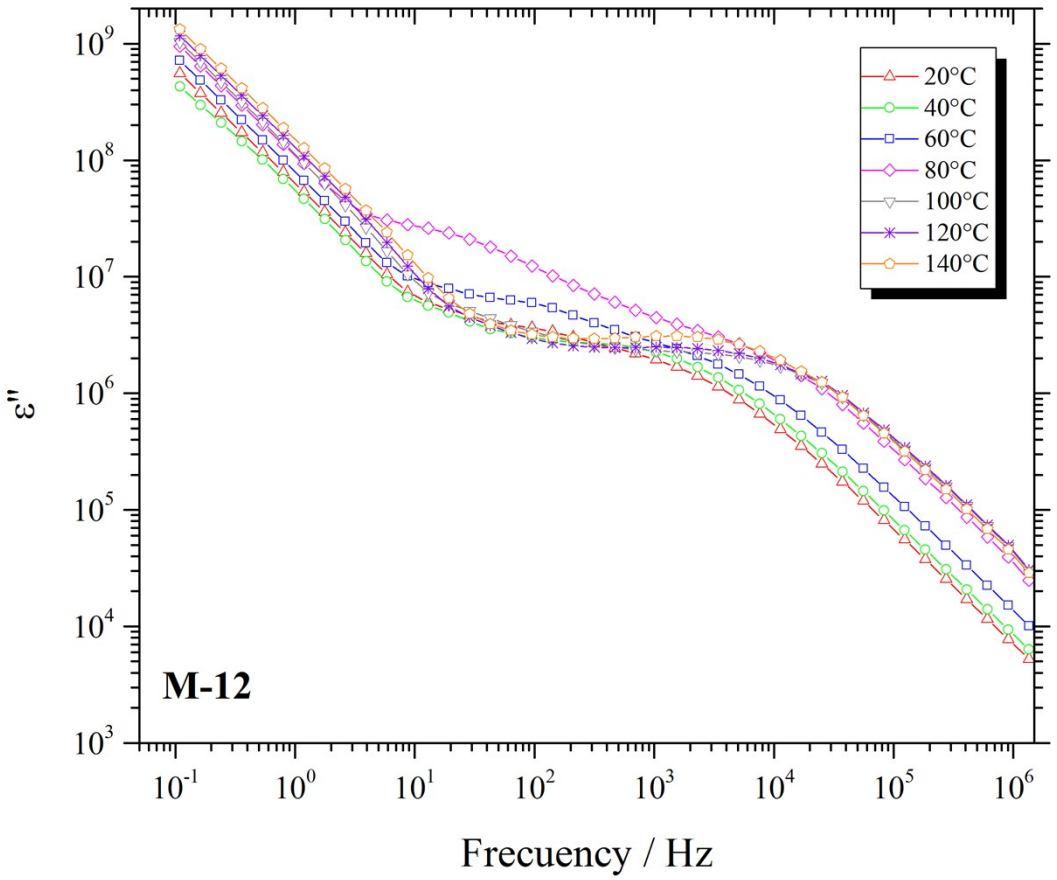

Figure S14.

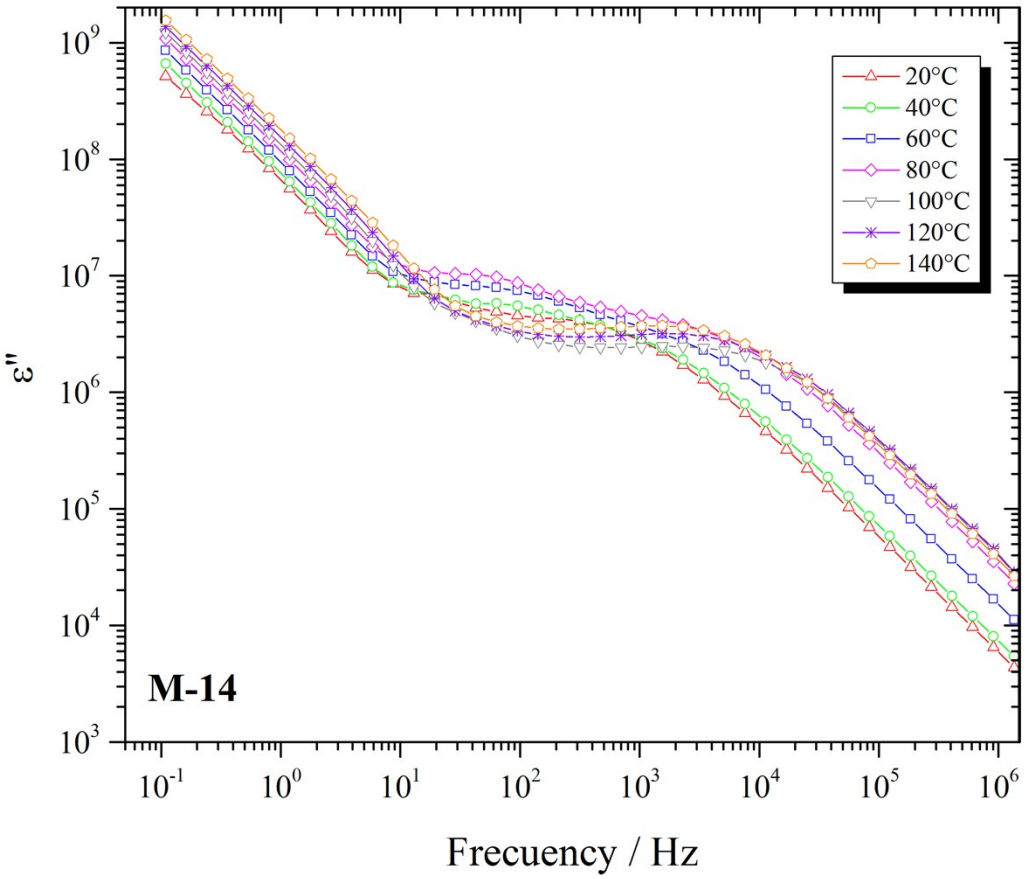

Figure S15.