

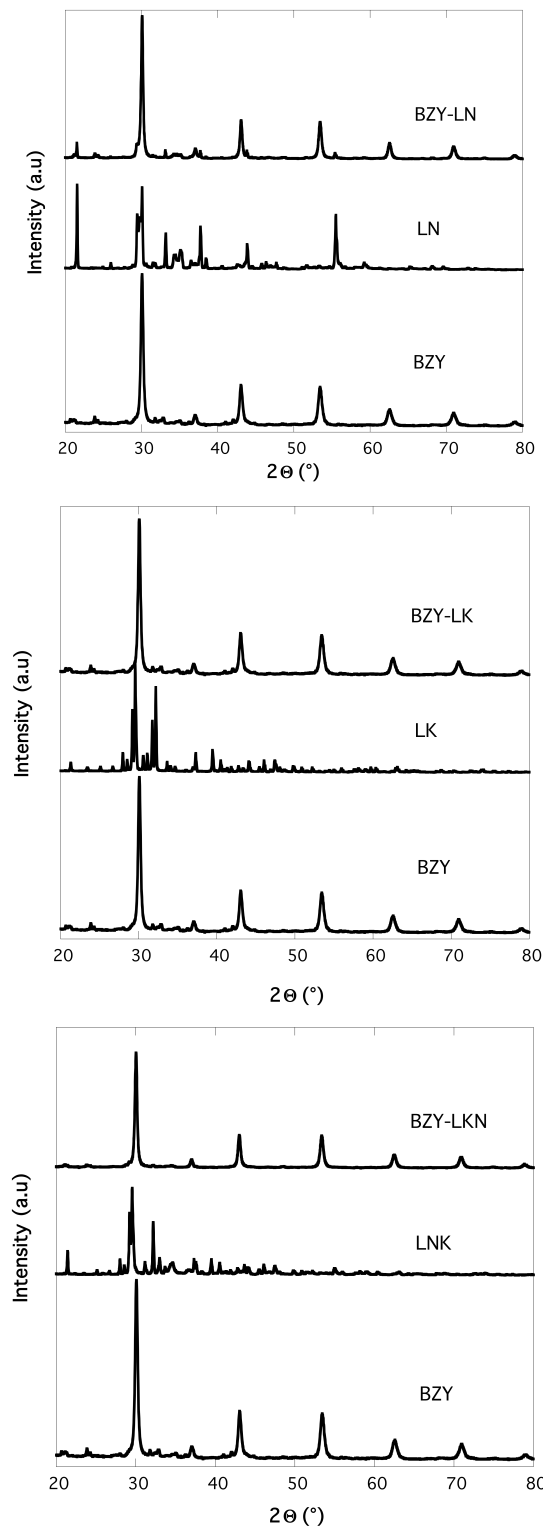


Figure 1: XRD patterns of BZY, alkali carbonates and BZY- alkali carbonate composites.

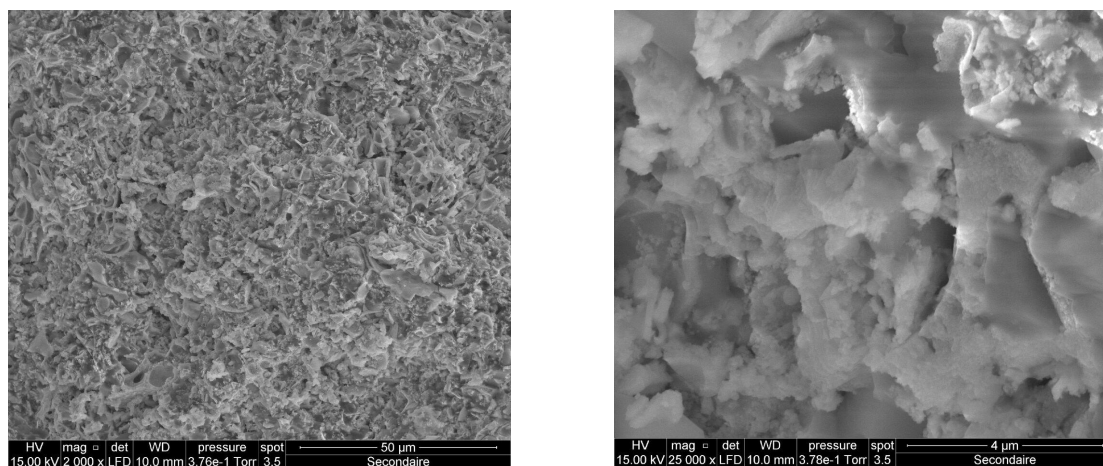


Figure 2: Representative SEM images of BZY – alkali carbonate composites at low (a) and high (b) magnifications.

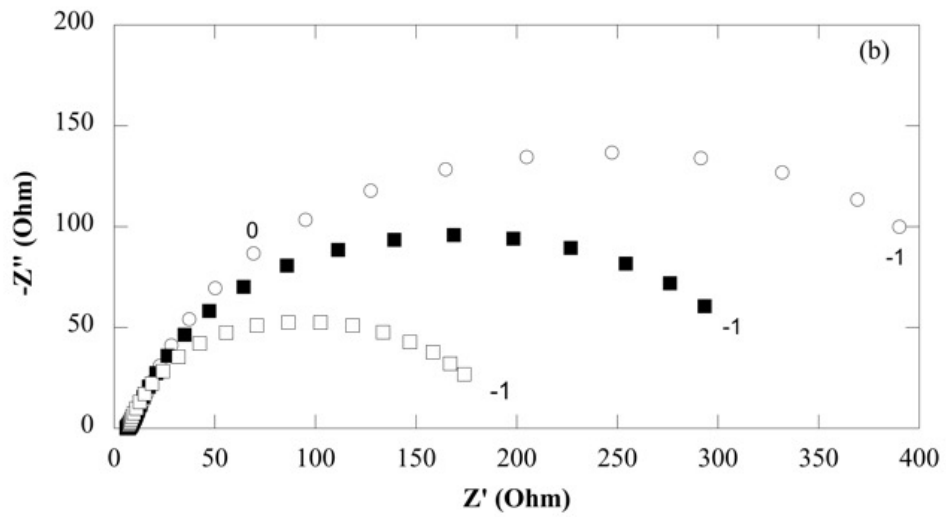
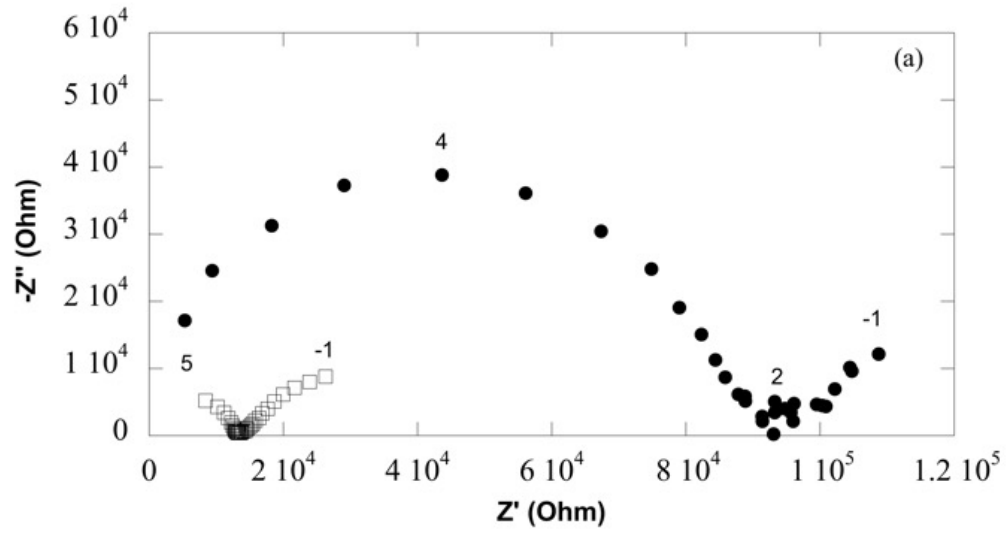


Figure 3: Impedance spectra of BZY-LK30 composites measured under air at (a) 350°C (●) and 400°C (□) and (b) at 500°C under different amplitudes: 10mV (○), 100 mV (■) and 200 mV (□). The numbers correspond to the frequency logarithm.

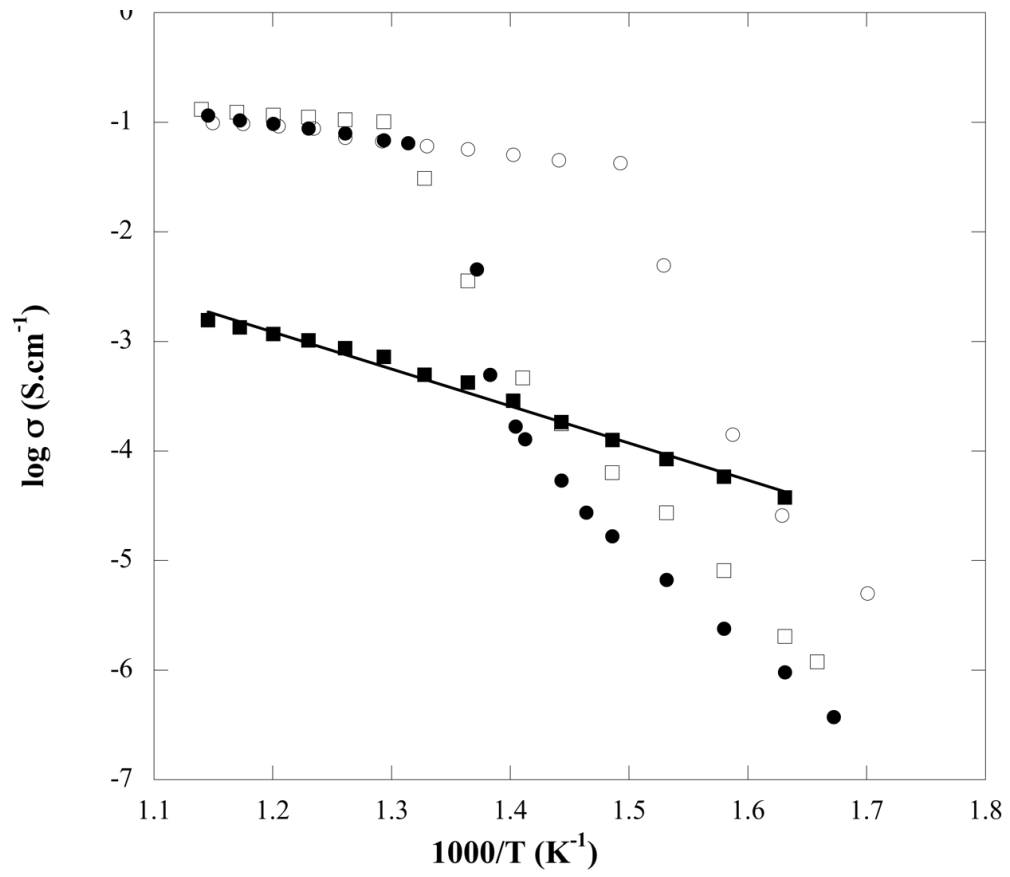


Figure 4: Arrhenius plots of the conductivity of BZY-LN30 ($\square$), BZY-LK30 ($\bullet$), BZY-LKN30 ($\circ$) and BZY ($\blacksquare$) under dry air.

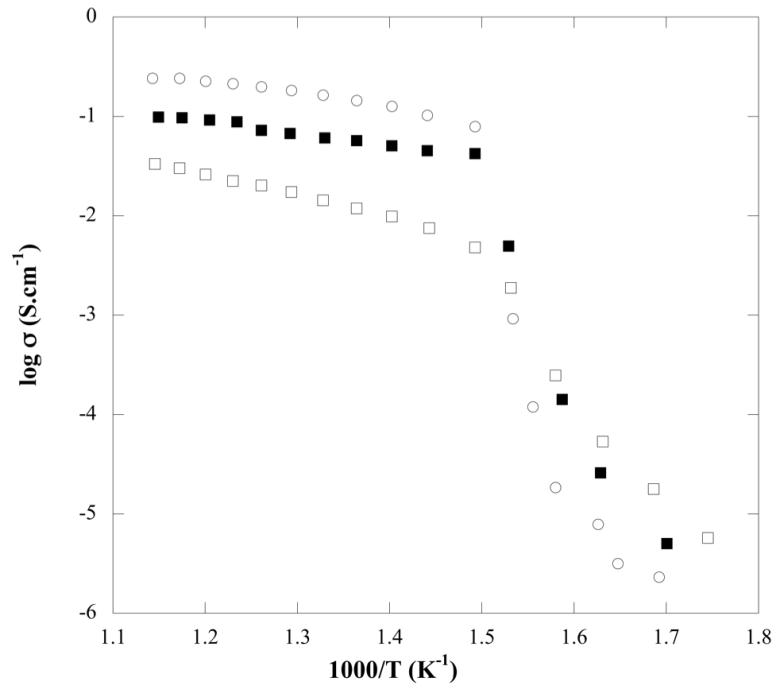


Figure 5: Arrhenius plot of the conductivity of BZY-LKN composites under air (○: BZY-LNK40, ■ : BZY-LKN30, □: BZY-LKN20)

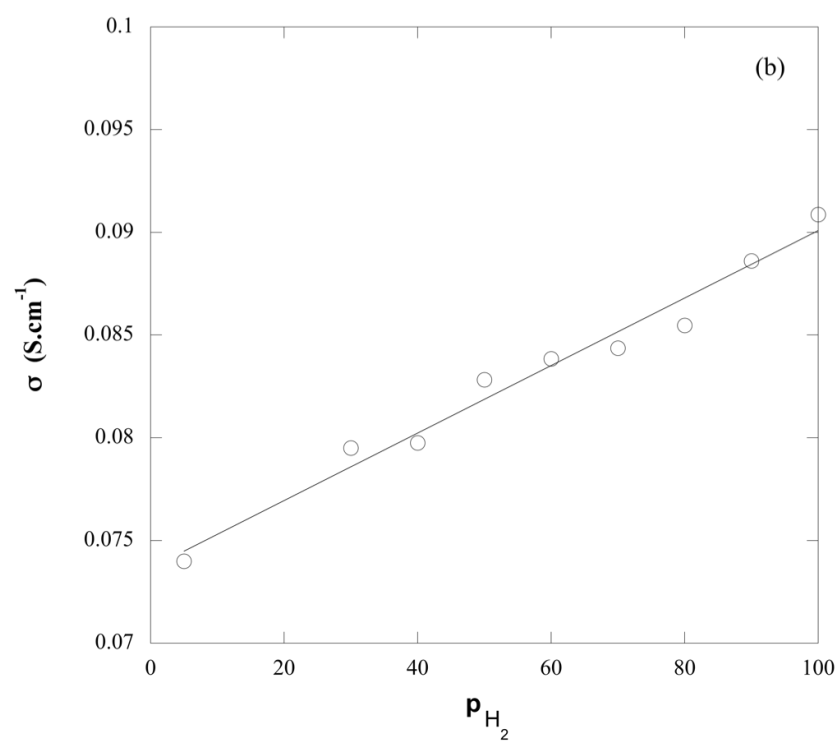
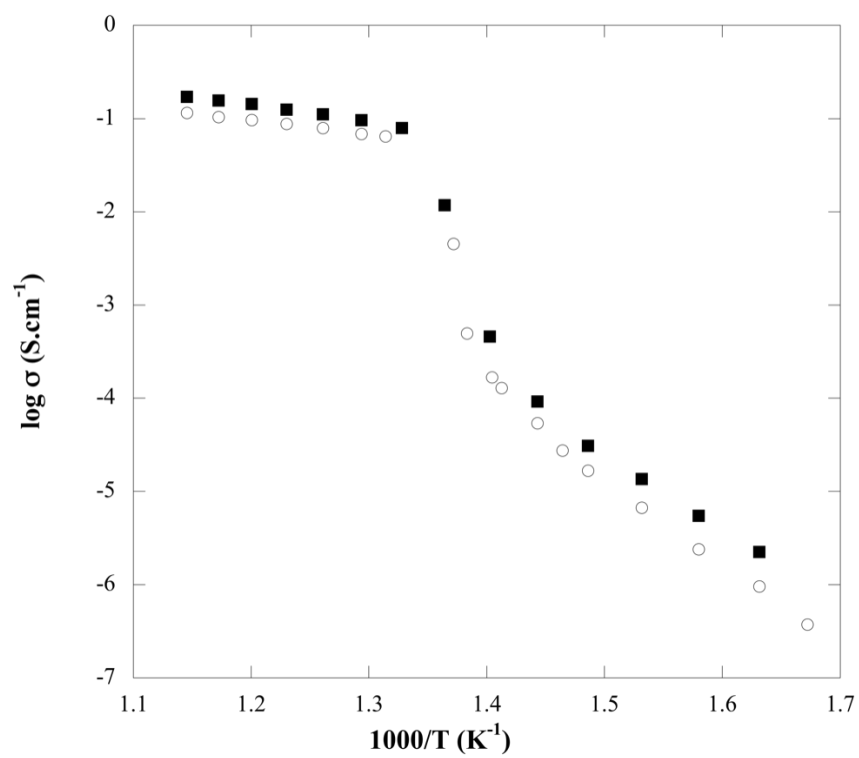


Figure 6: Conductivity of BZY-LK30 as a function of p_{H_2} at 500°C.

Systems	Composition mol%.			Melting temperature °C.	
	Li ₂ CO ₃	K ₂ CO ₃	Na ₂ CO ₃		
Li ₂ CO ₃ - K ₂ CO ₃	62	38	-	488	[212]
Li ₂ CO ₃ - Na ₂ CO ₃	52	-	48	501	[211]
Li ₂ CO ₃ - K ₂ CO ₃ - Na ₂ CO ₃	43.5	25	31.5	397	[210]

Table 1: Composition and melting temperature of binary and ternary alkali carbonate eutectics.

	BZY-LN30	BZY-LK30	BZY-LKN30	BZY-LKN20	BZY-LKN40
Atmosphere	air	air/ H ₂	air	air	air
Ea _{HT}	0.148	0.30/ 0.34	0.22	0.36	0.30
σ (mS.cm ⁻¹) at 500°C	100	71/102	69	17	192
σ (mS.cm ⁻¹) at 400°C	6.3 10 ⁻²	1.6 10 ⁻² /3 10 ⁻²	4.3 10 ⁻²	6 10 ⁻²	8.7 10 ⁻²

Table 2: Calculated activation energies and conductivities for BZY – alkali carbonate composites. Ea_{HT} corresponds to the activation energies in the high temperature domain.