

Introduction

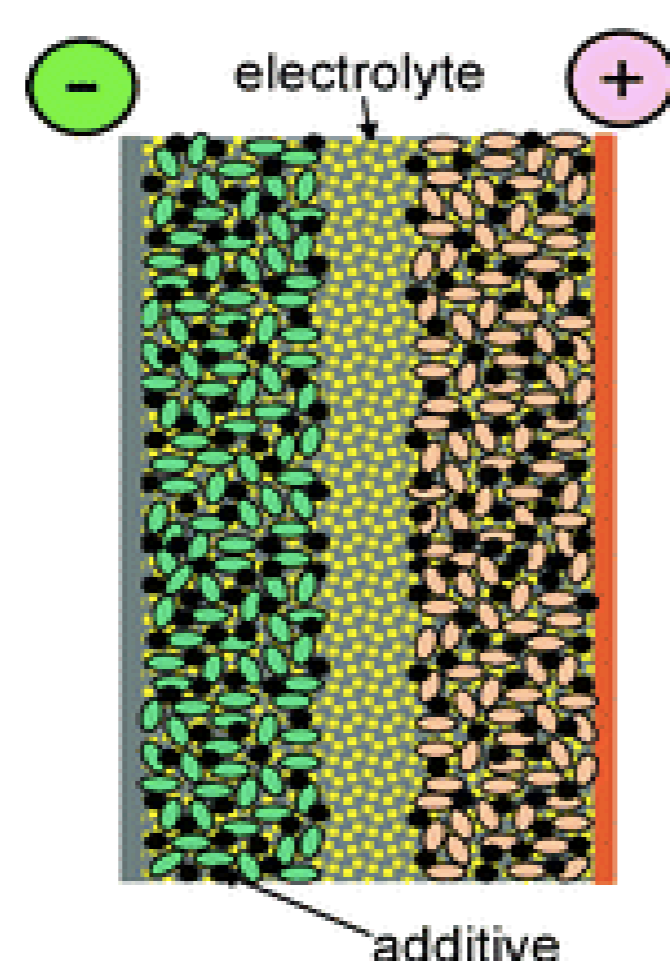
Schematic of all-solid-state Lithium-ion batteries

Characteristics

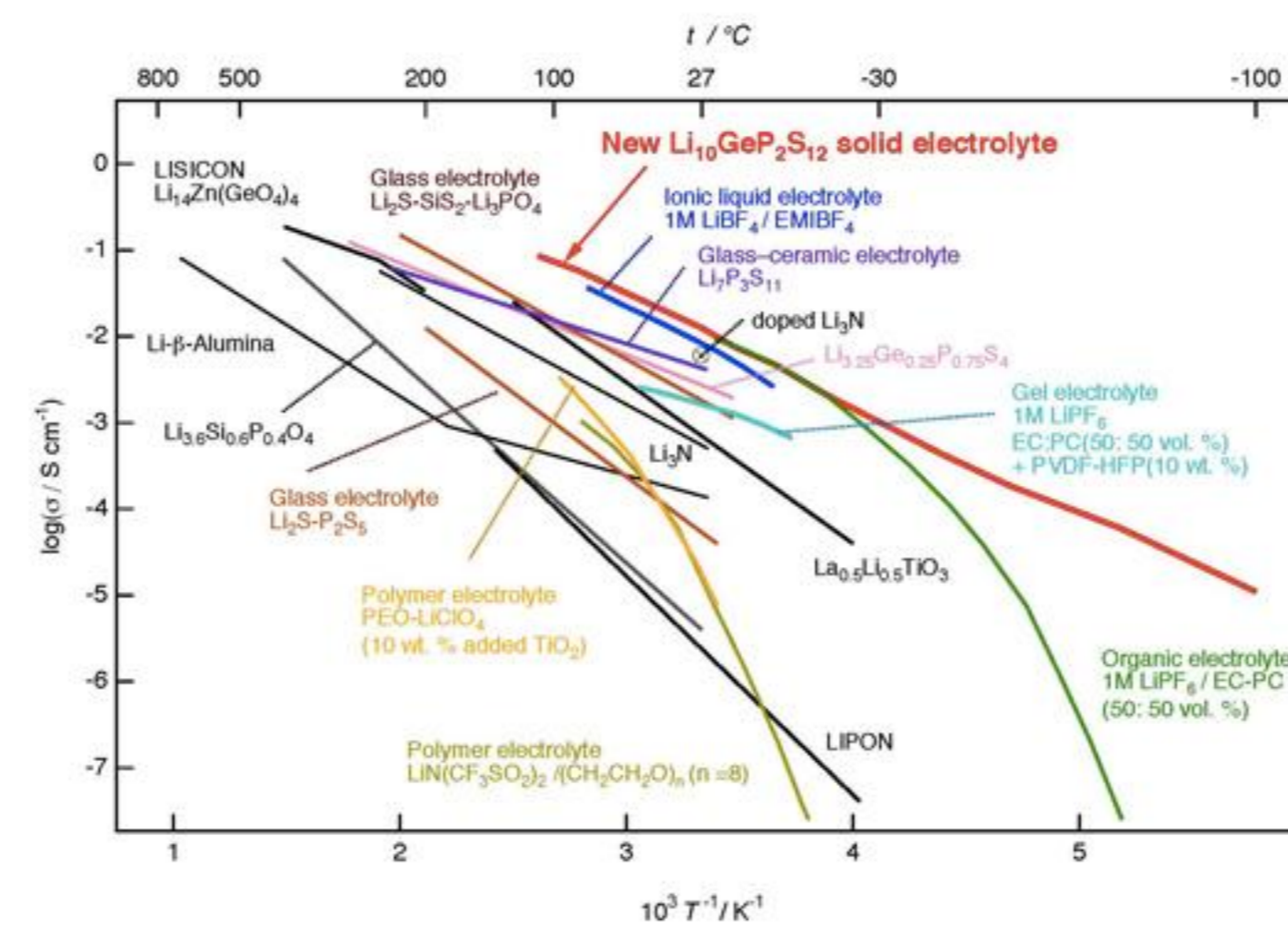
- ☞ Good safety (non-explosive)
- ☞ High stability (non-volatile)
- ☞ Simple fabrication

Problems

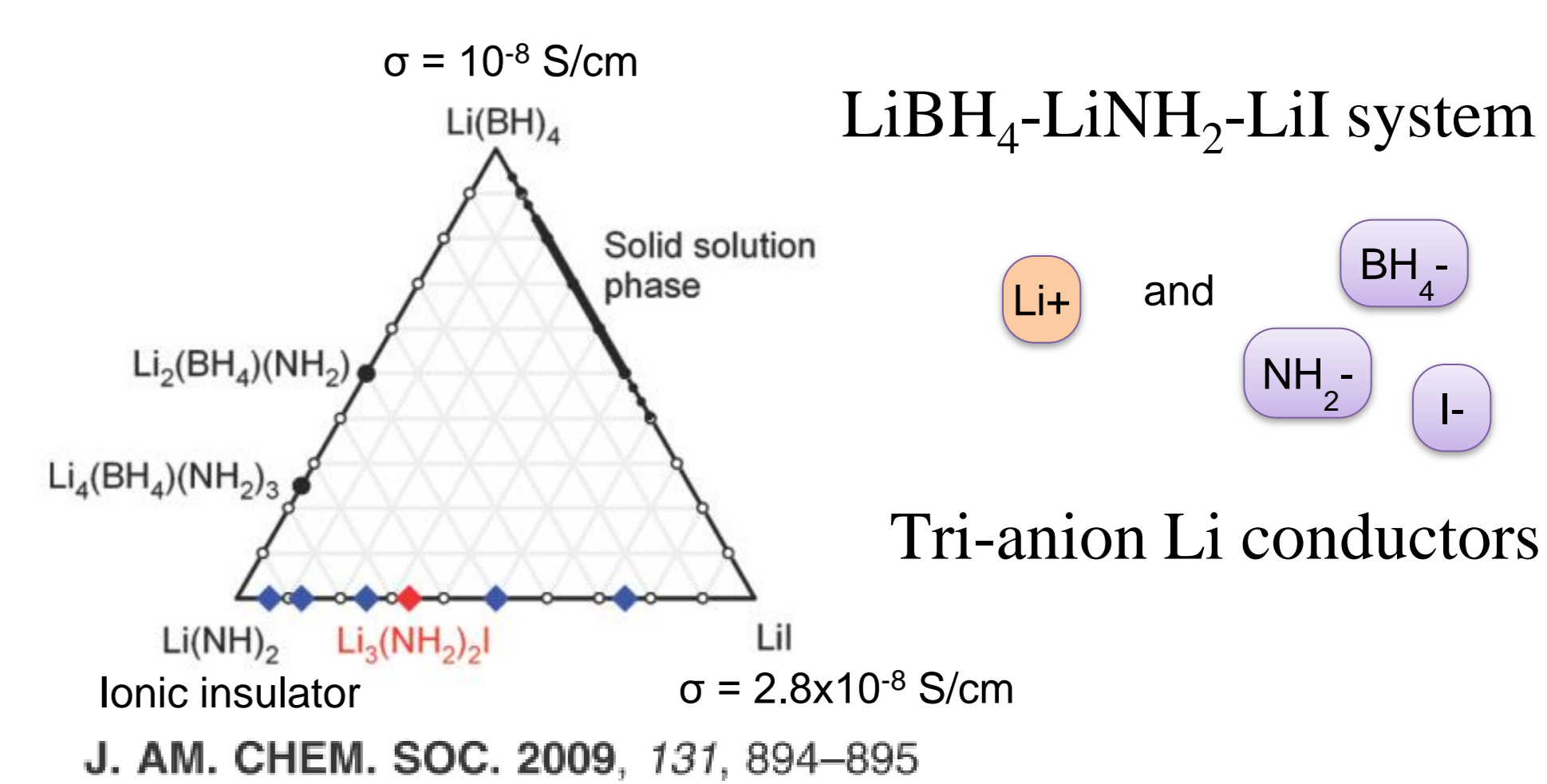
- ☞ Low ionic conductivity of solid electrolyte
- ☞ Contact surface between solid electrolyte and electrodes



Super ionic conductor materials

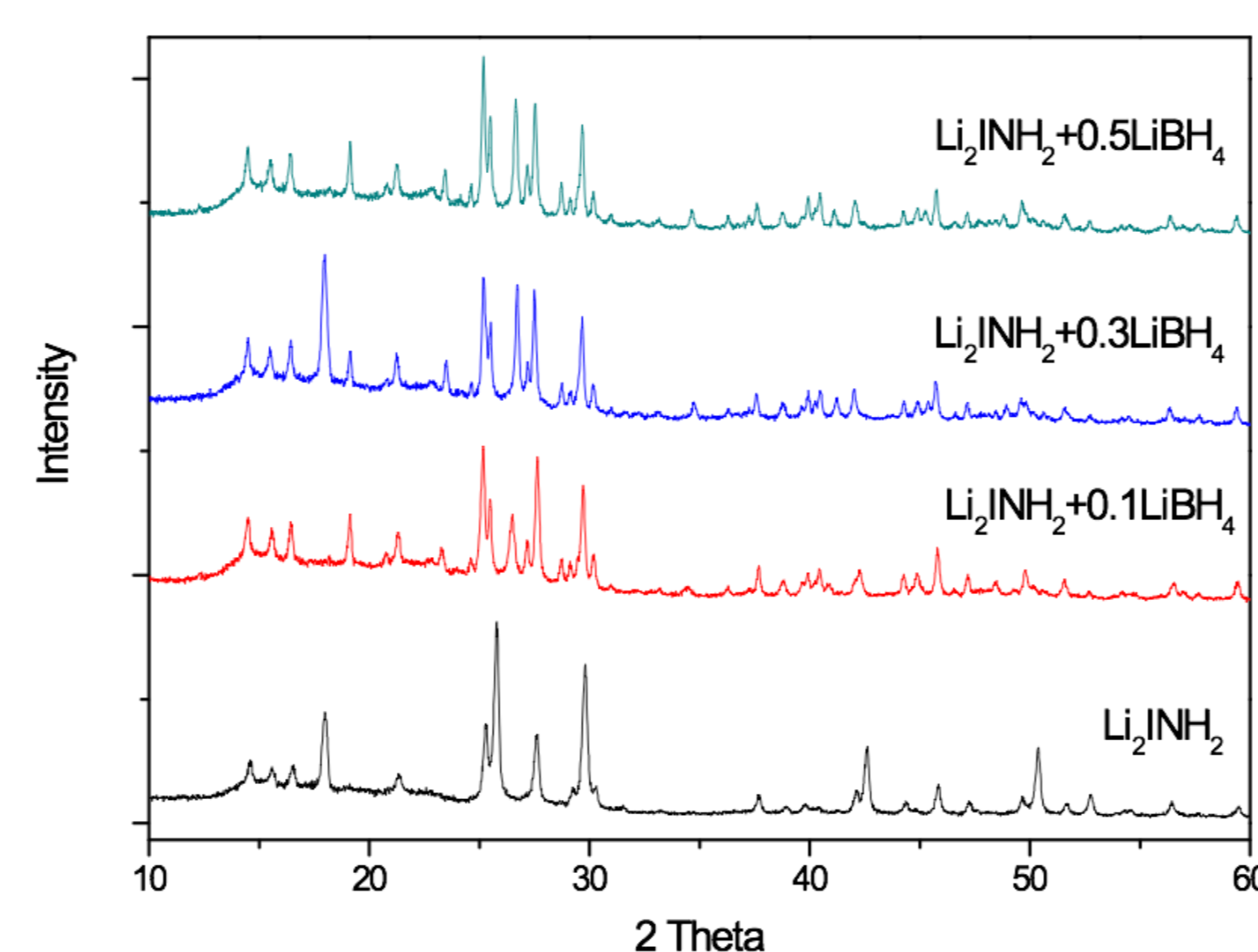
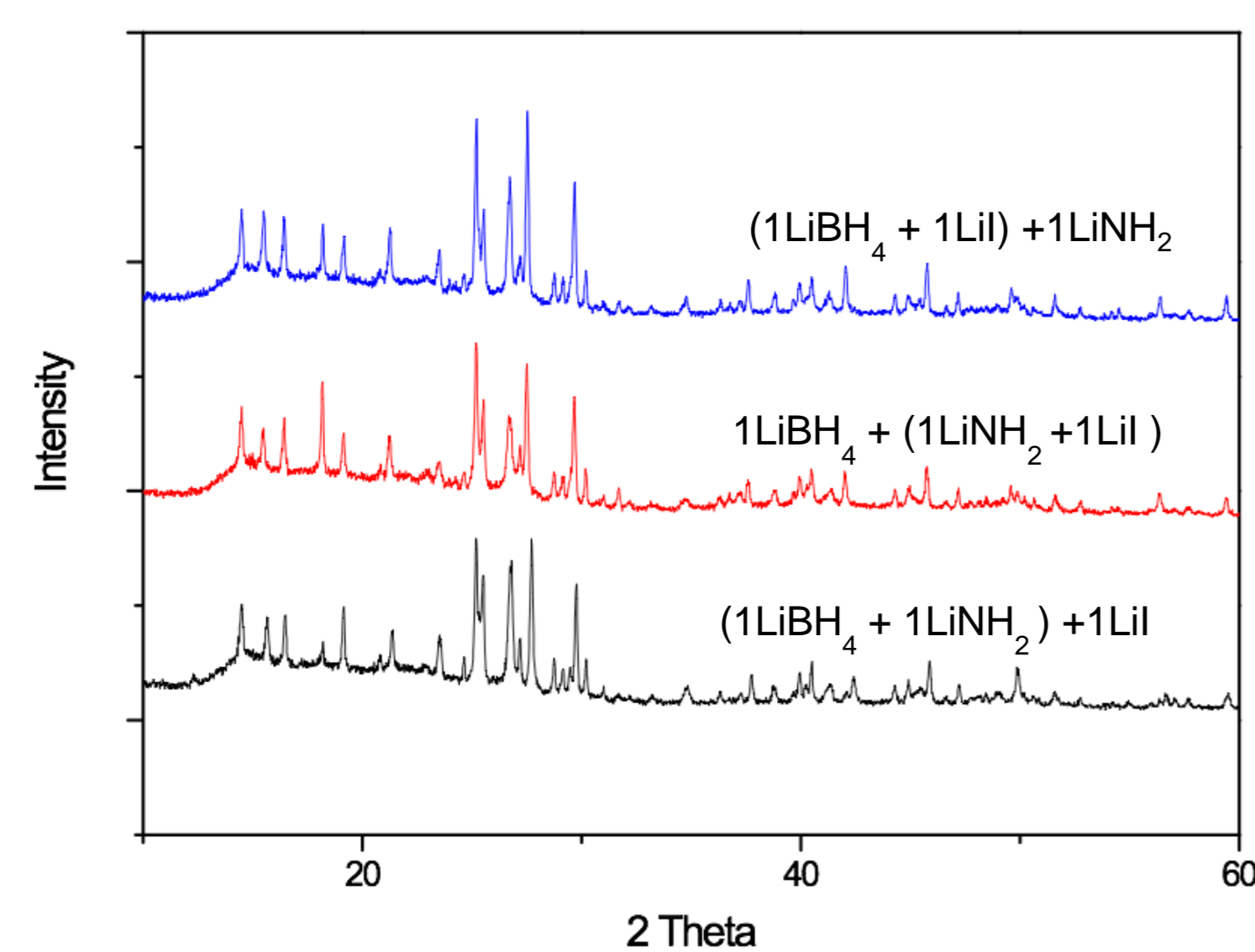


Interesting electrolyte materials

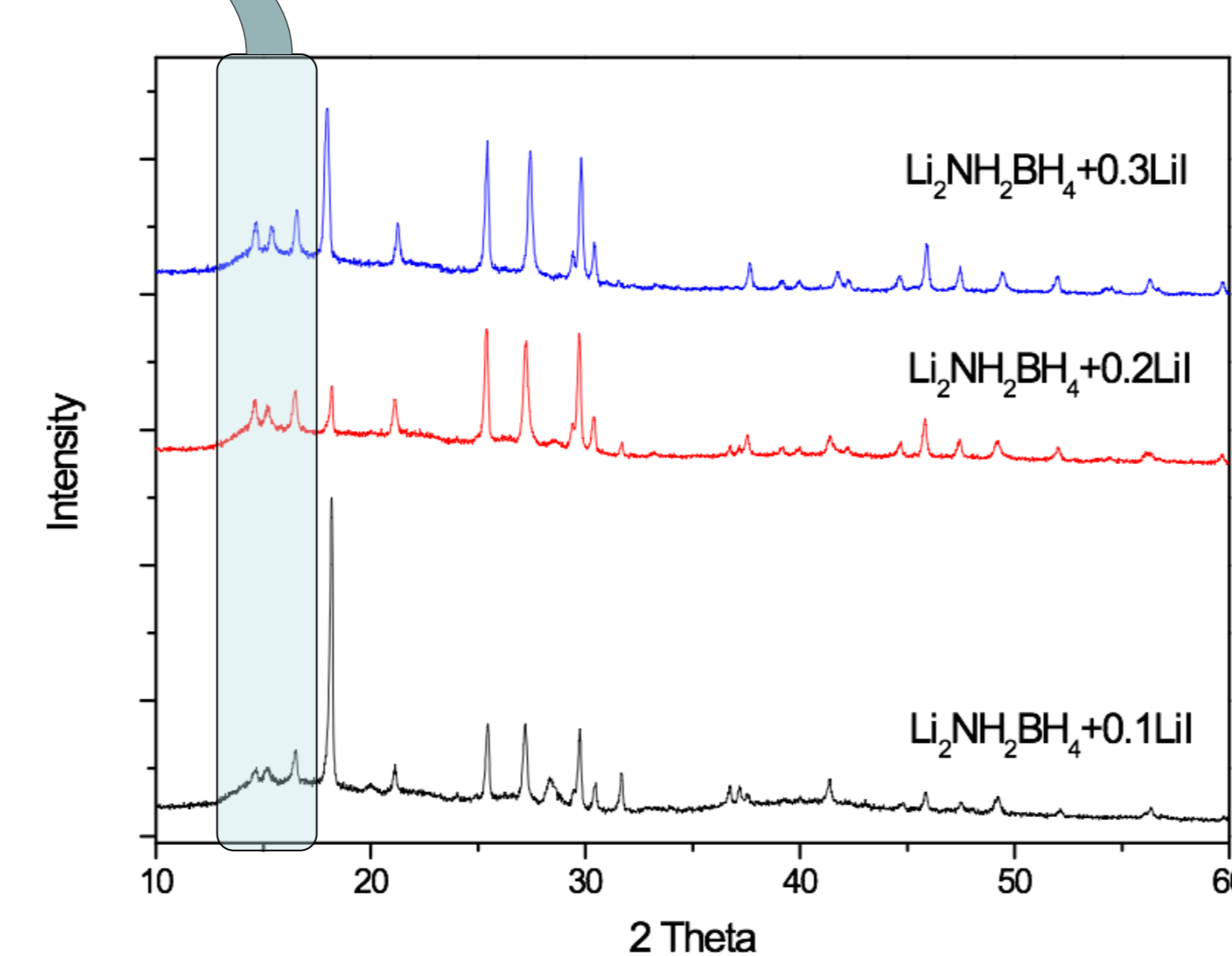
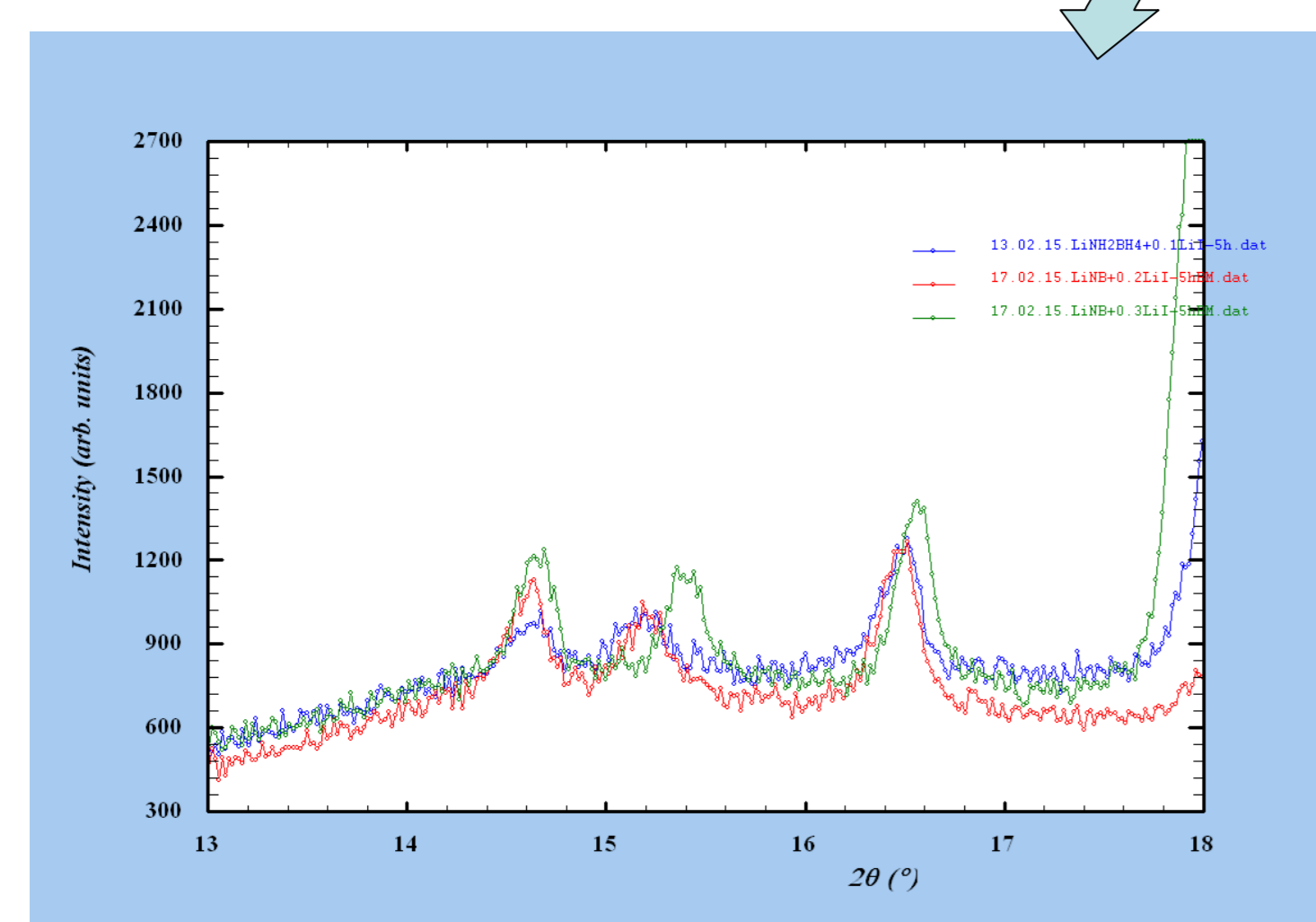


Experimental and Discussion

XRD patterns and peak indexing

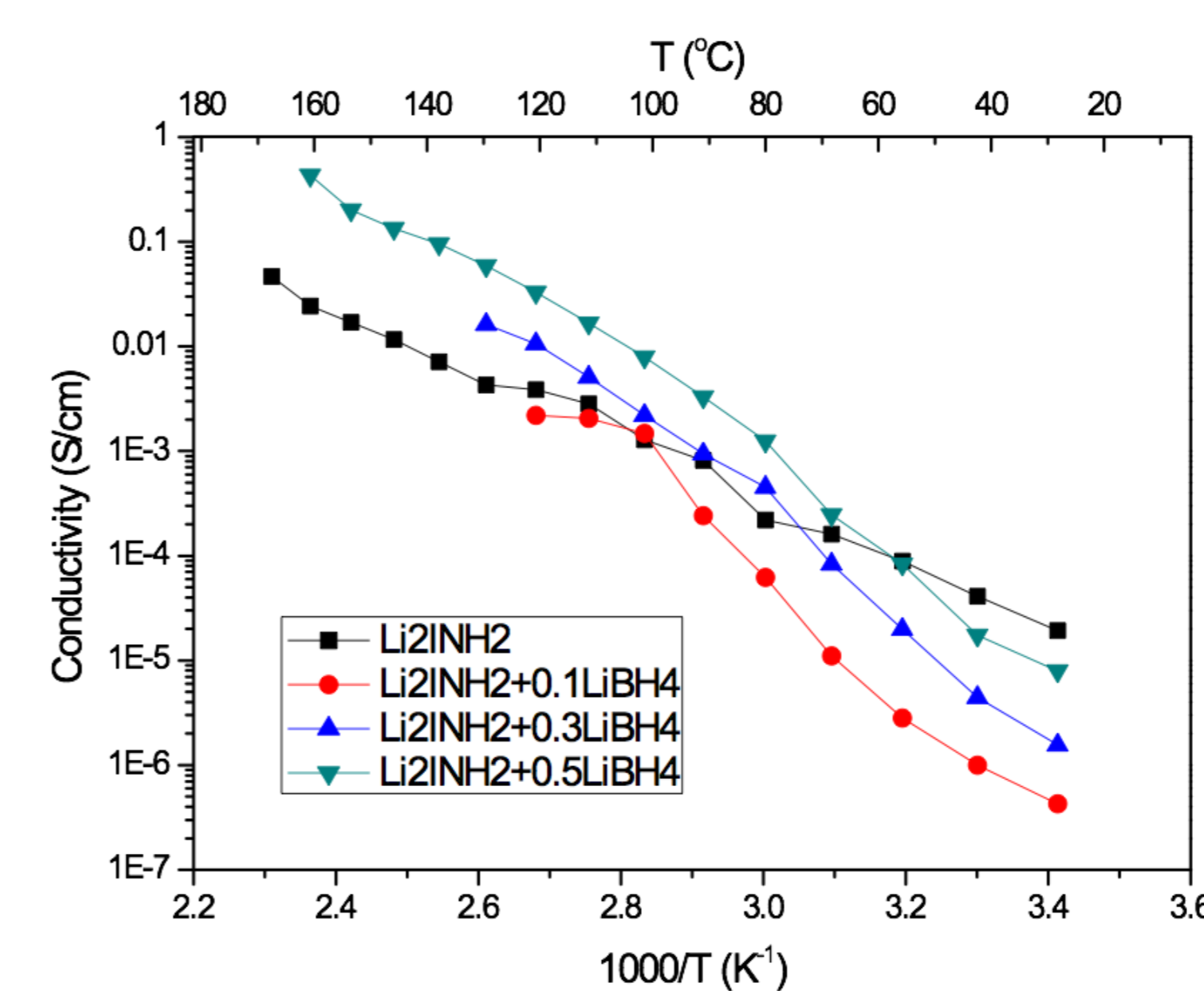


Similar XRD patterns were obtained by changing order of reaction in the ternary system in mechanical reaction. It suggests to the occurrence of a new single phase. So in order to elucidate this, evolution of the phase has been studied.

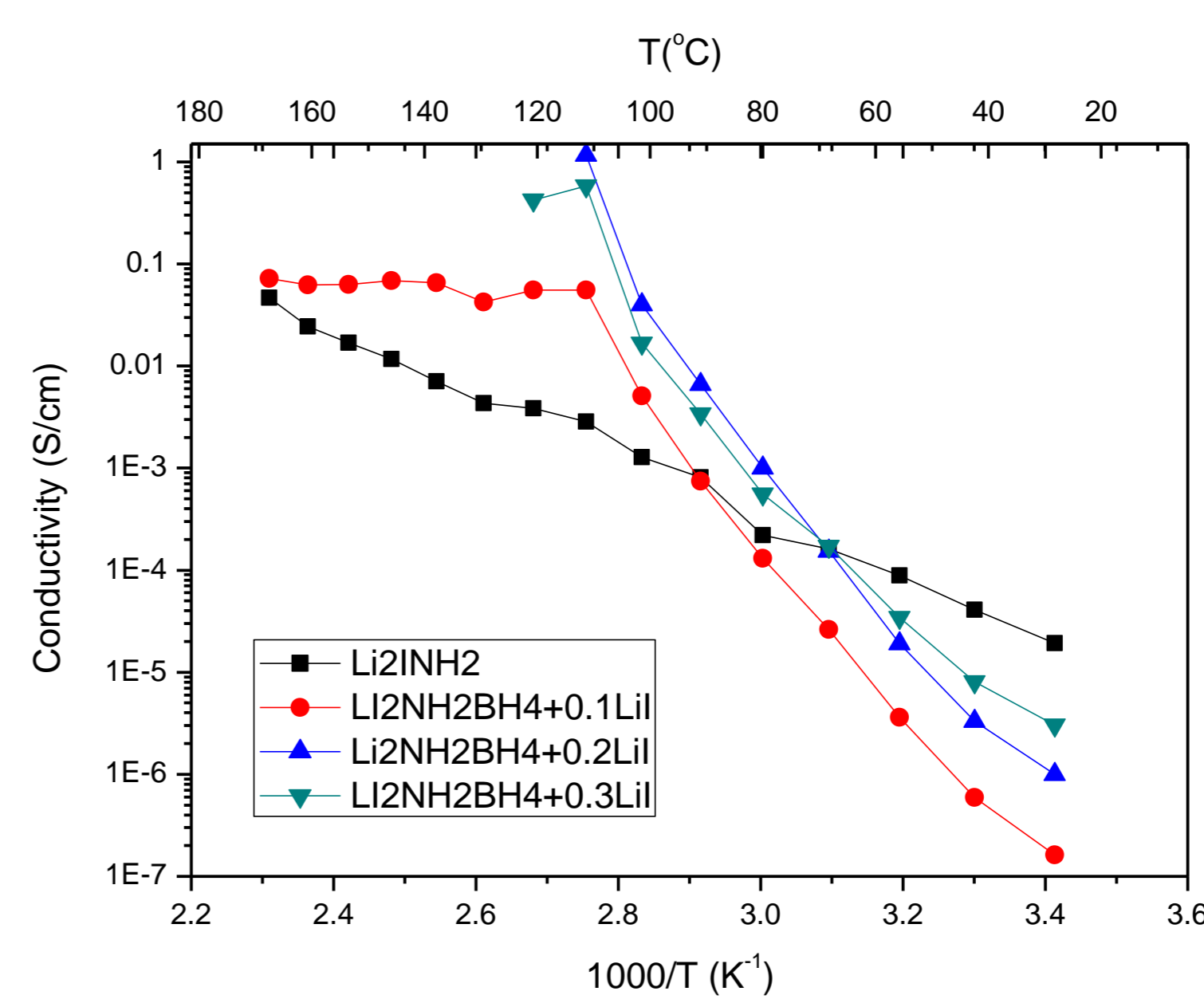


Conductivity

Similar to complexes between LiBH_4 and LiNH_2 , and LiNH_2 and LiI , the new phases from the ternary system also show good conductivity compared to the reactants.



By increasing ratio of LiBH_4 , the conductivity of the system increases.



Similar phenomena occur by increasing ratio of the third component.

Conclusions

- Tri-anion lithium conductors containing BH_4^- , NH_2^- and I^- can form single solid solution with different ratio of anions.
- Tri-anion lithium conductors containing BH_4^- , NH_2^- and I^- show promising properties toward lithium ionic conductance.

Out looks

- Stability of the new phase toward application in Lithium-ion batteries (LIBs) need to be studied.
- Understanding about the crystalline structure and mechanism of the mechanochemical reaction also need to be understood.

Acknowledgement

The research leading to these results has received funding from the "People Program (Marie Curie Actions) of the European Union's Seventh" Framework Program FP7/2007-2013/ under REA grant agreement n° 607040 (Marie Curie ITN ECOSTORE) is thankfully acknowledged.