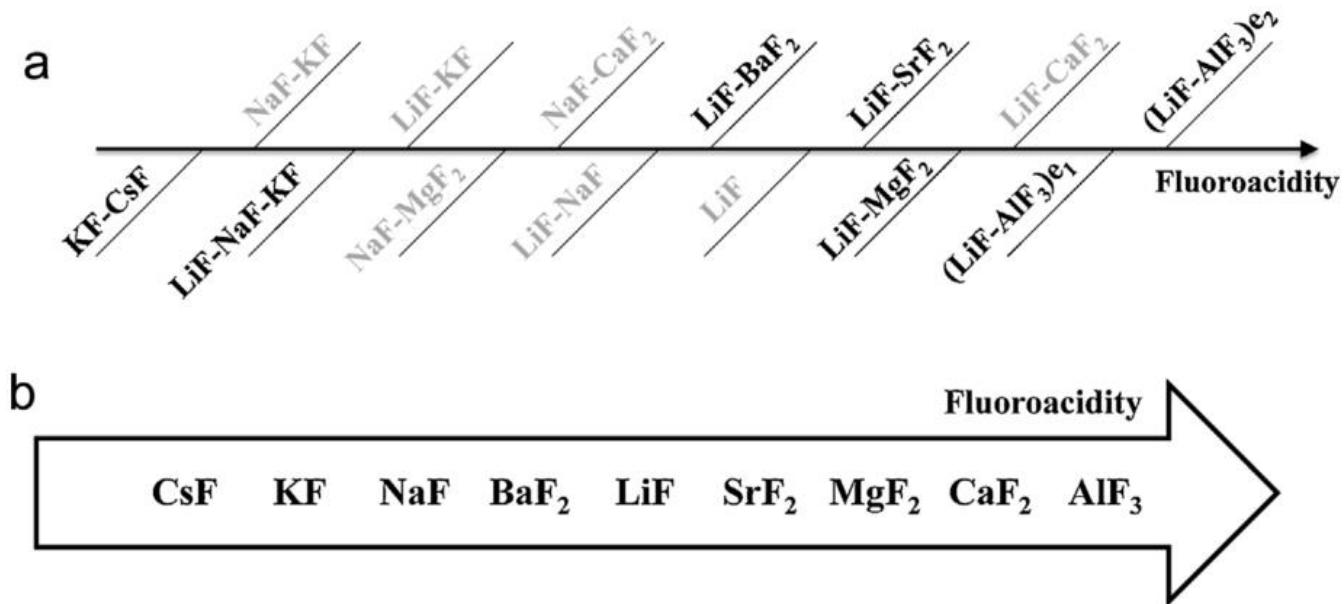
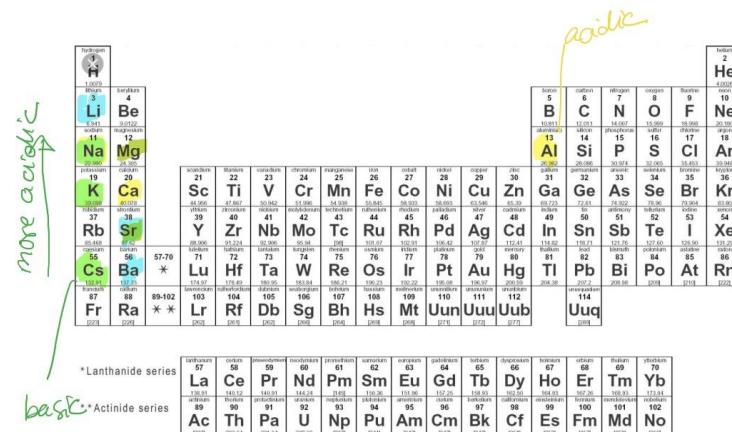


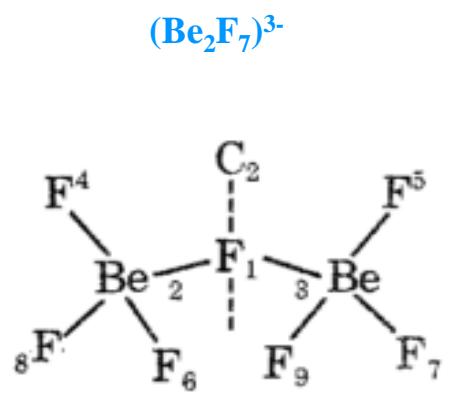
L12, 13 2/27, 3/1: Fluorine Potential, Fluoro-acidity and More Chemical Thermodynamics



**Fig. 3.** (a) Qualitative fluoroacidity scale of various eutectic mixtures (in light grey results published by Bieber *et al.* [16]) (b) Qualitative fluoroacidity scale of different fluoride compounds



## Complex Ions



## Polymeric Structures and Bridging Fluorines

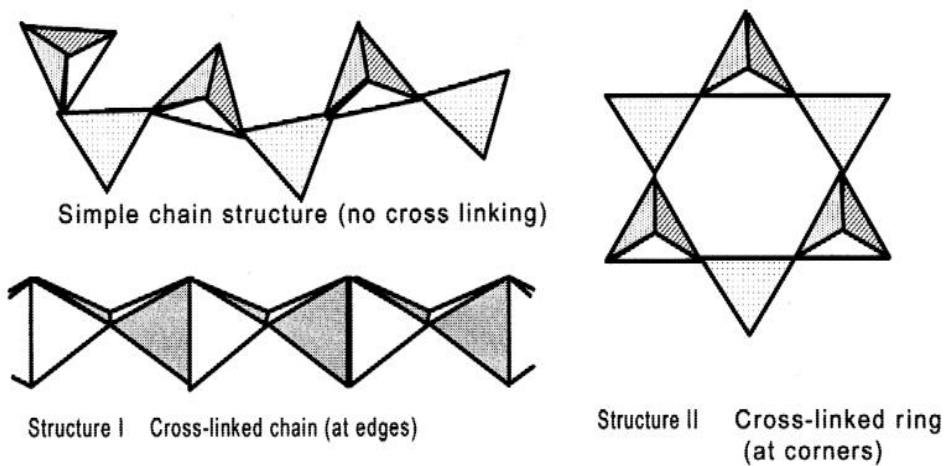


Fig. 4. Elementary polymeric structures of  $\text{BeF}_2$  in Flibe.

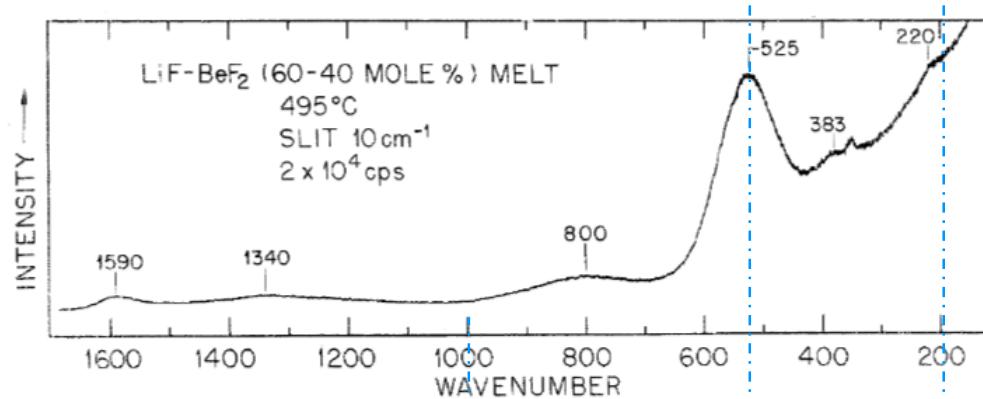
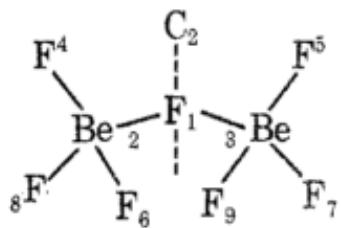
# Complex Ions Available Data

## Raman spectroscopy of FLiBe

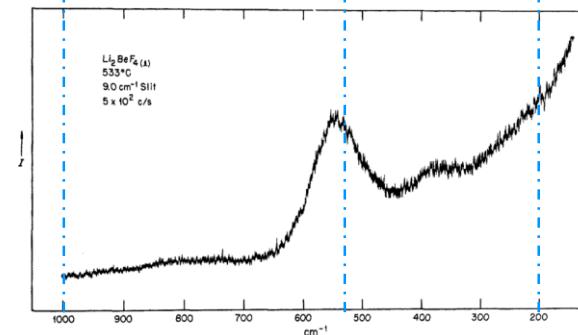
75-25 (550°)	70-30 (550°)	66-34 (540°)	60-40 (525°)	54-46 (495°)	48-52 (479°)
235	230		220		
375	367	365	383		
550 (p)	550 (p)	540 (p)	525 (p)	490 (p)	480 (p)
795	790	790	800	800	820
1190	1140		1180		1210
1350	1340		1345		1360
1590	1585		1590		1605

<sup>a</sup> Compositions given in mol per cent LiF-BeF<sub>2</sub>, respectively, and frequencies in cm<sup>-1</sup>. (p) indicates polarized bands.

525 cm<sup>-1</sup> peak  
attributed to (Be<sub>2</sub>F<sub>7</sub>)<sup>3-</sup>



Raman spectra of molten LiF-BeF<sub>2</sub> (60-40 mol%) at 495°C [1]



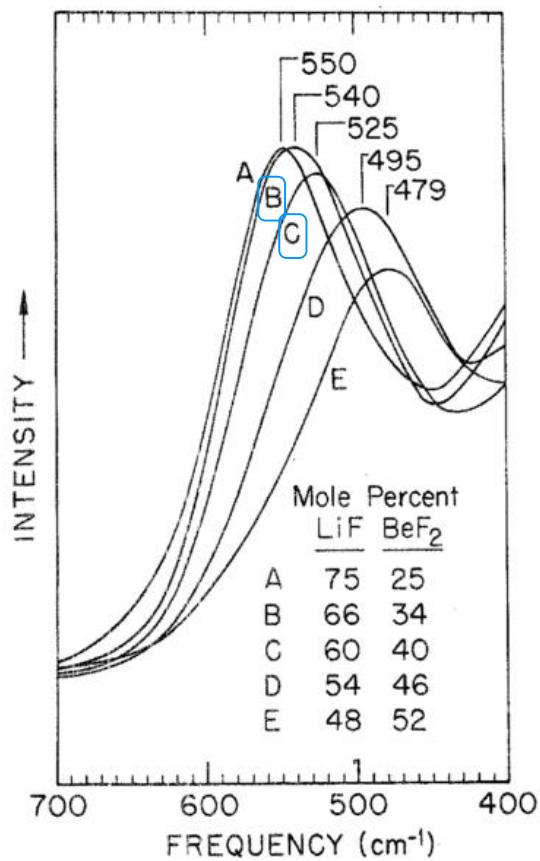
Raman spectra of molten Li<sub>2</sub>BeF<sub>4</sub> at 533°C [2]

[1] L. M. Toth, J. Bates, et al., 'Raman Spectra of Be<sub>2</sub>F<sub>7</sub> and Higher Polymers of Beryllium Fluorides in the Crystalline and Molten State', vol. 77, no. 2, (1972).

[2] A. S. Quist, J. B. Bates, et al., 'Raman spectra of tetrafluoroberyllate ion in molten sodium fluoride and lithium fluoride to 686 C', J. Phys. Chem., vol. 76, no. 1, pp. 78-83, (1972).

# Raman of Flibe

## Complex Ions



**Figure 5.** Raman spectra of LiF-BeF<sub>2</sub> system as the melt composition is changed showing a shift in the symmetric vibrational mode: (A) 690°; (B) 588°; (C) 452°; (D) 480°; (E) 434°.

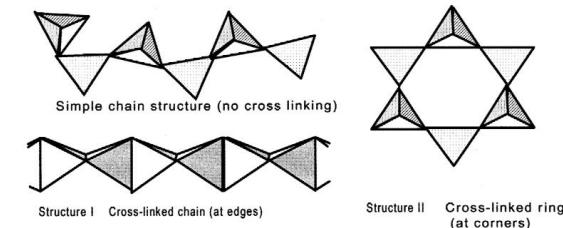
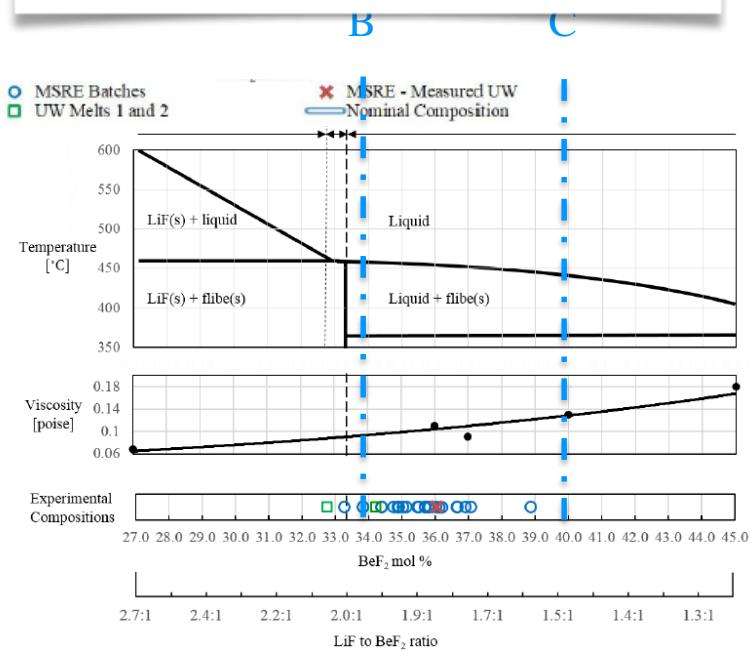


Fig. 4. Elementary polymeric structures of BeF<sub>2</sub> in Flibe.

[3]



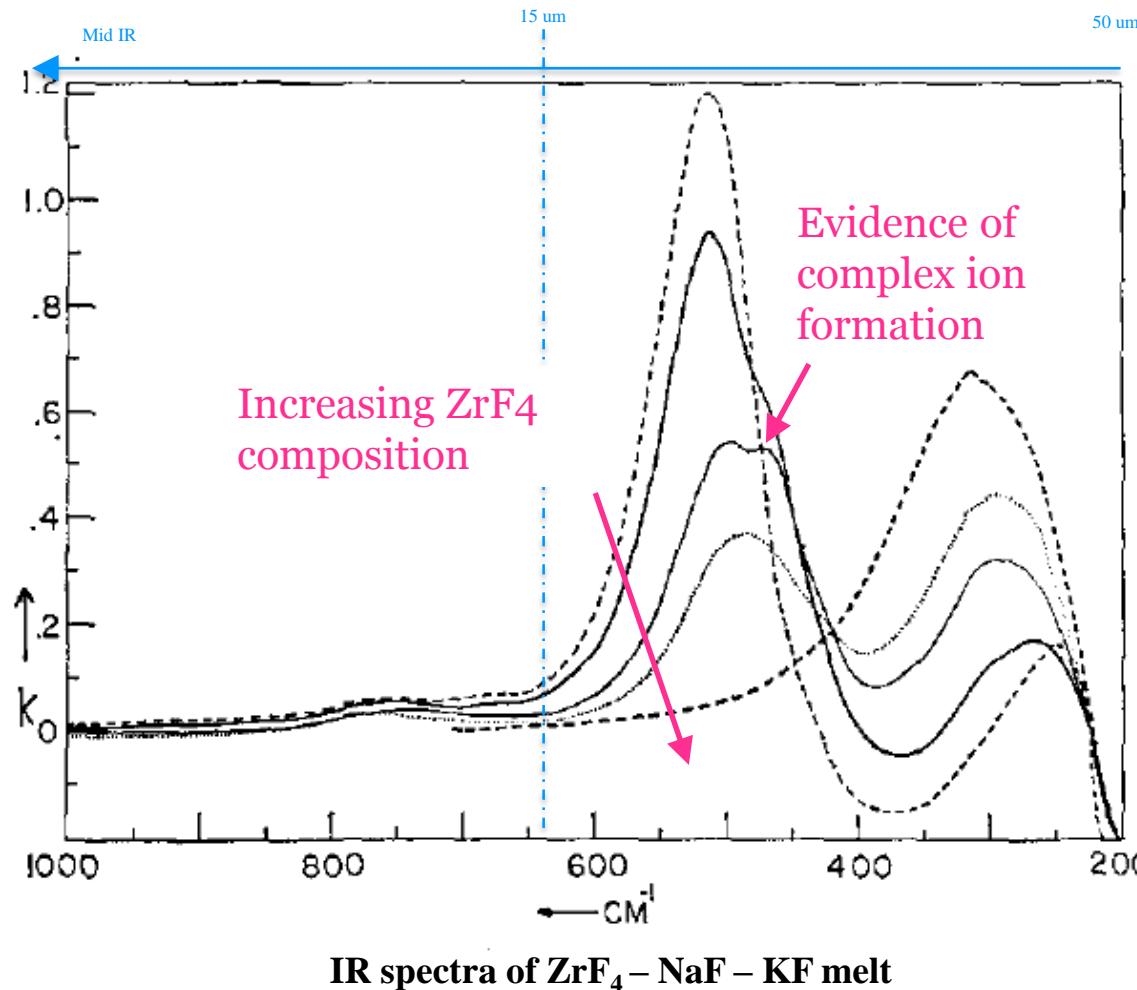
[1] L. M. Toth, J. Bates, et al., 'Raman Spectra of BeF<sub>7</sub> and Higher Polymers of Beryllium Fluorides in the Crystalline and Molten State', vol. 77, no. 2, (1972).

[2] F. Carotti, R. O. Scarlat, et al. Experimental and Modeling Studies of Over-Cooling Transients in FHR. NURETH-16. (2015). Chicago, IL.

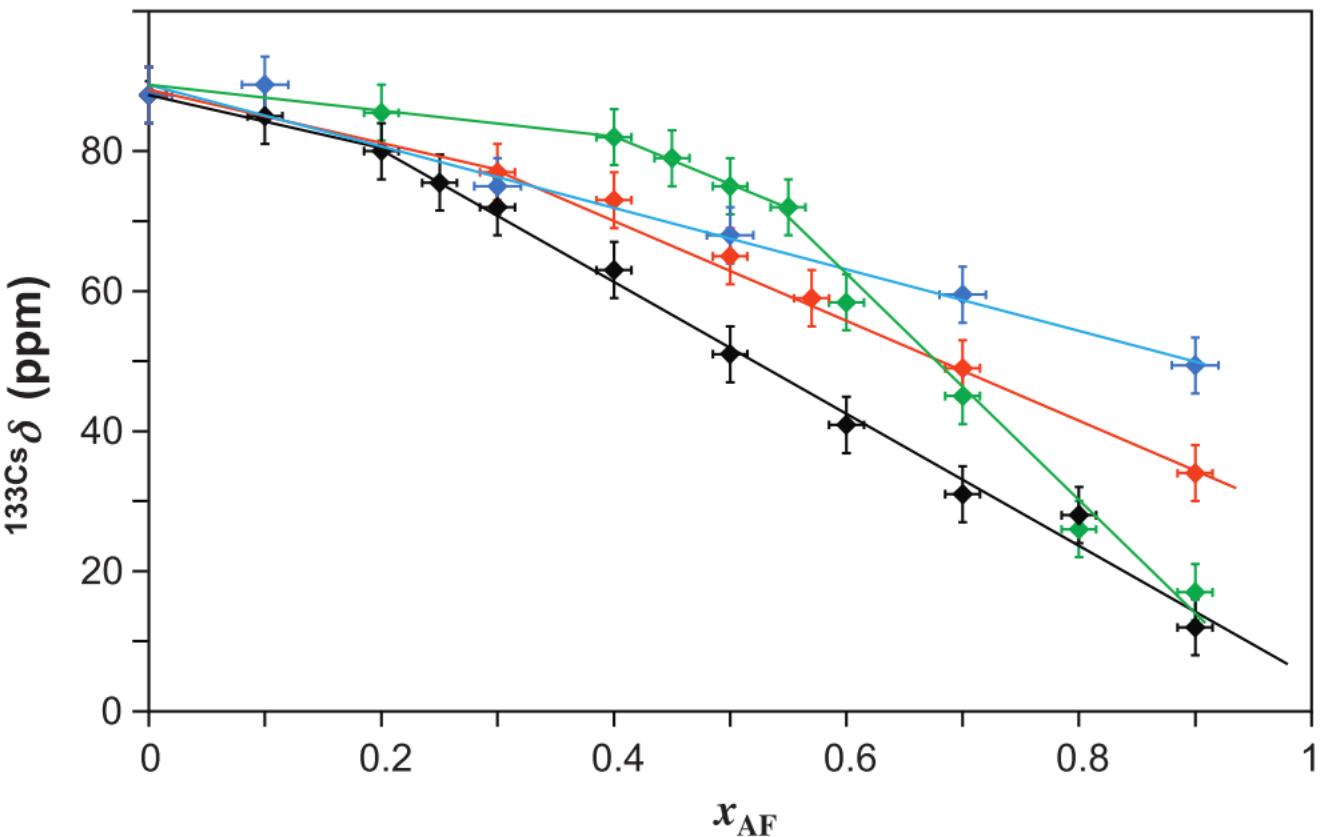
[3] Olander, Fukuda, Baes. "Equilibrium pressures over BeF<sub>2</sub>/LiF (flibe) molten mixtures" Fusion Science and Technology. 41 (2002) 141 - 150.

# Absorption Spectroscopy of NaF-KF-ZrF<sub>4</sub>

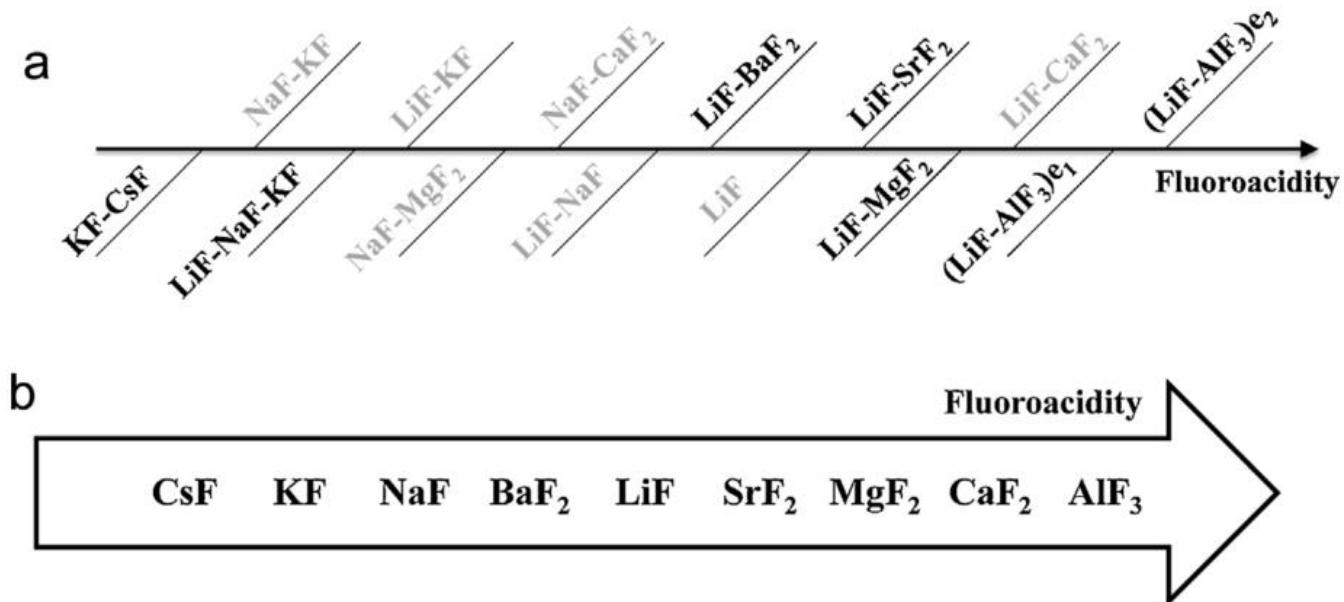
## Evidence of complex ion formation



Medium-range  
order: LiF clusters  
in a CsF network.



**Fig. 5.**  $^{133}\text{Cs}$  chemical shift  $^{133}\text{Cs}\delta$  as a function of the AF molar fraction  $x_{\text{AF}}$  for CsF-LiF (green), CsF-NaF (black), CsF-KF (red), CsF-RbF (blue). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of the article.)



**Fig. 3.** (a) Qualitative fluoroacidity scale of various eutectic mixtures (in light grey results published by Bieber *et al.* [16]) (b) Qualitative fluoroacidity scale of different fluoride compounds

