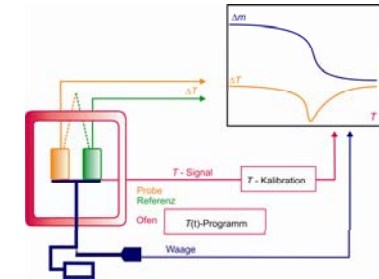




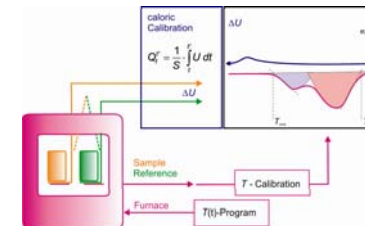
MAXIMIL

Maximum Operation Temperature (MOT) - Bestimmung von Applikationsdaten ionischer Flüssigkeiten (IL) mit Hilfe nicht-isothermer Messungen zur thermischen Stabilität

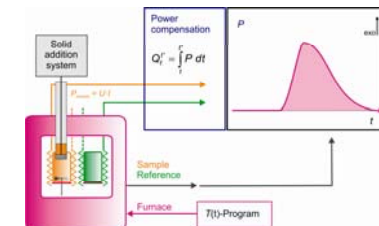
Simultaneous Thermal Analysis (DTA/TG/MS)



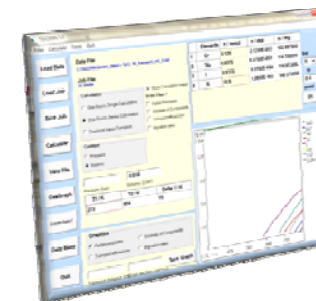
Dynamic Calorimetry (DSC)

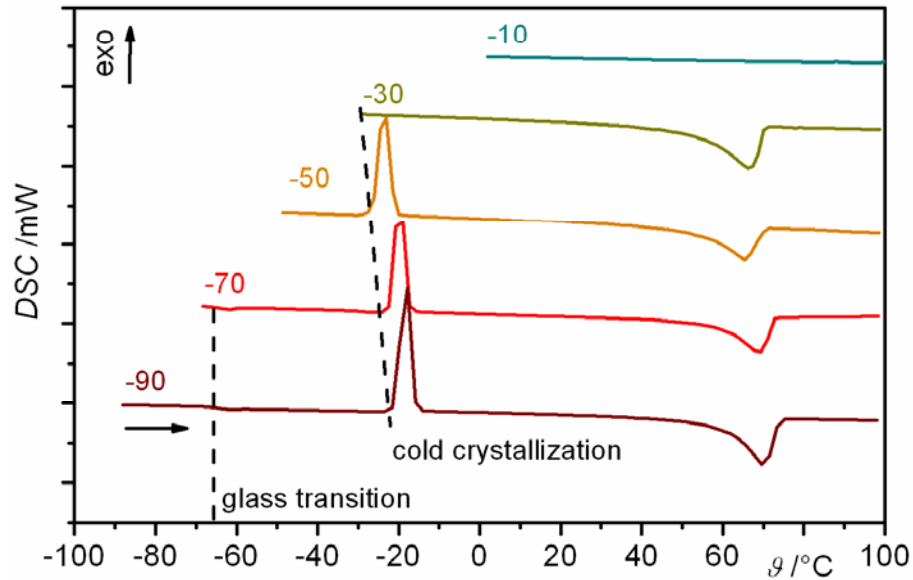


Reaction Calorimetry



Modeling

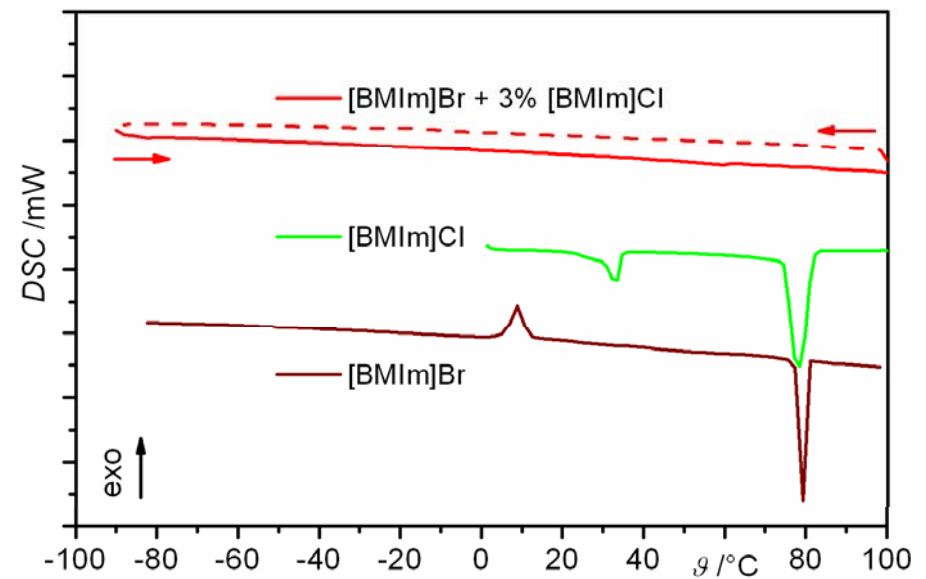
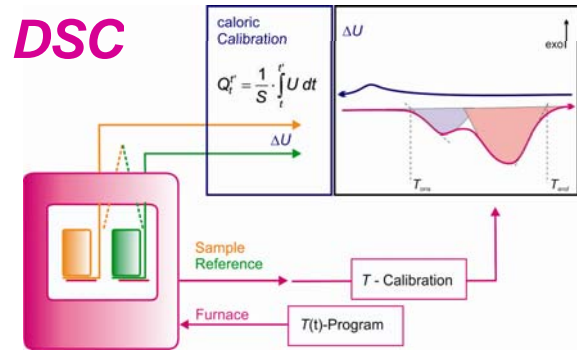


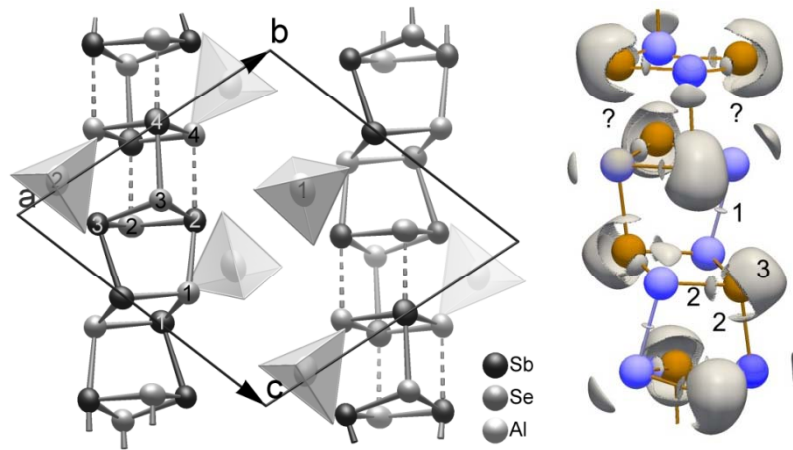


[BMIm]X (X = Cl, Br)

Thermochim. Acta **2013**, 573, 162.
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DSC

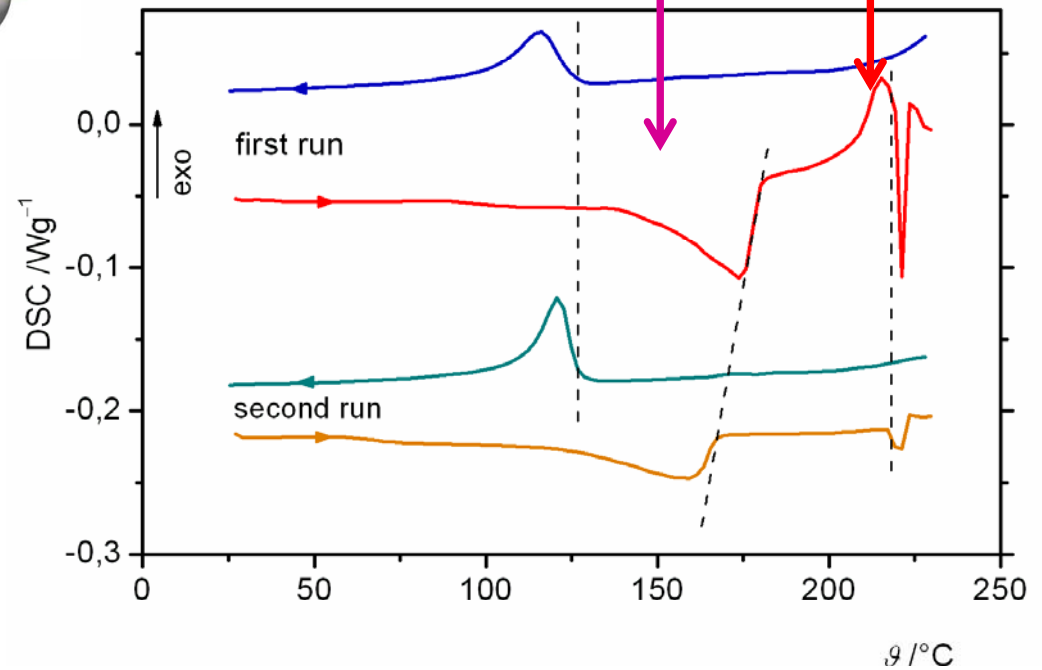
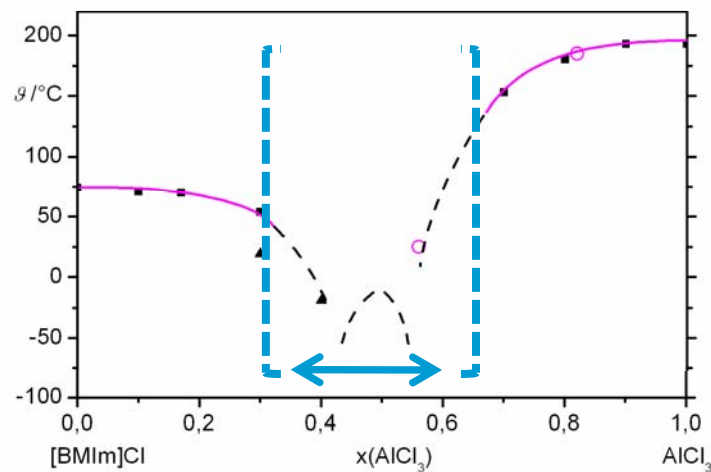




Endothermic melting:
 $[BMIm]Cl \cdot 4.7AlCl_3$

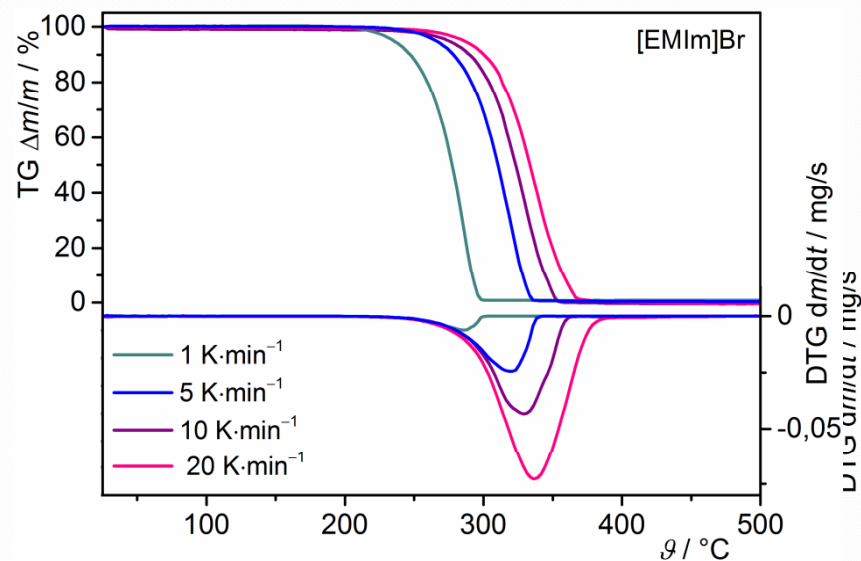
Formation of $[Sb_2Se_2]AlCl_4$

Exothermic reaction:
 $[Sb_{13}Se_{16}](AlCl_4)_6(Al_2Cl_7)$

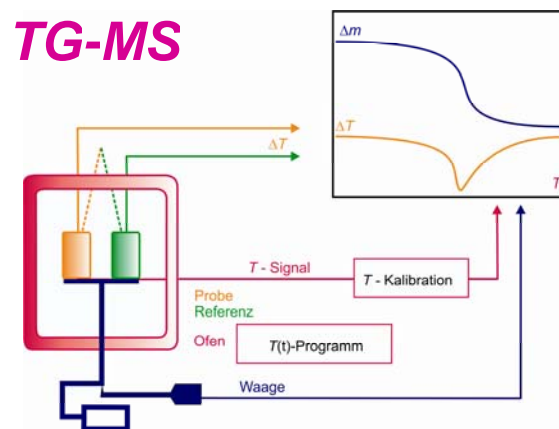


Z. Allg. Anorg. Chem. **2015**, 641, 388.

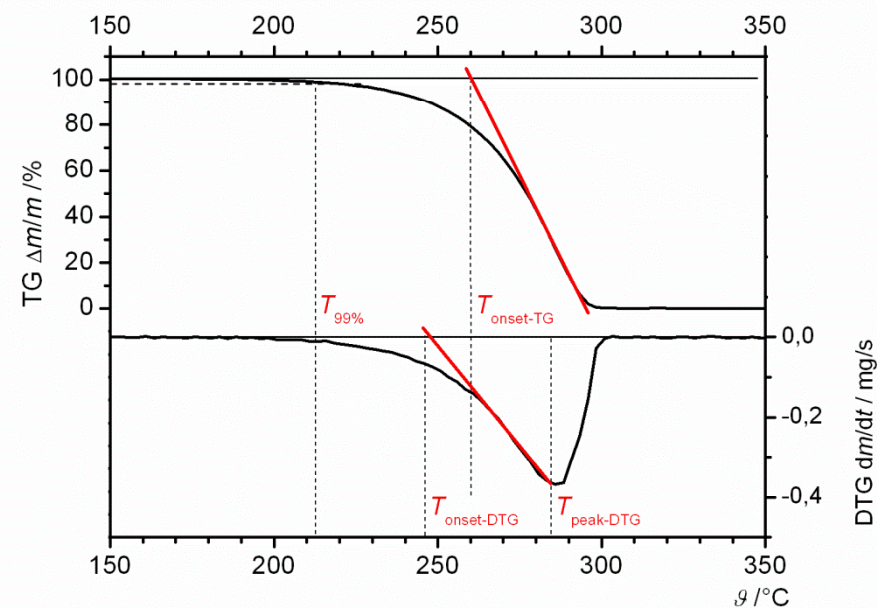
THERMAL STABILITY OF IONIC LIQUIDS

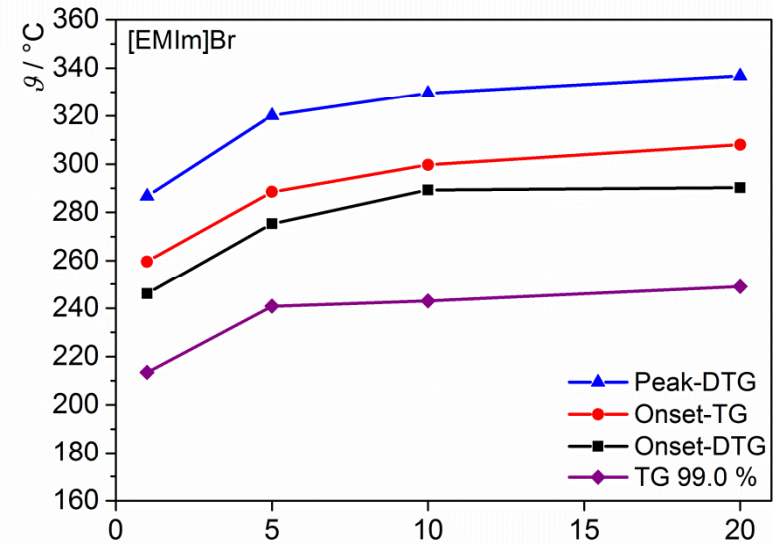
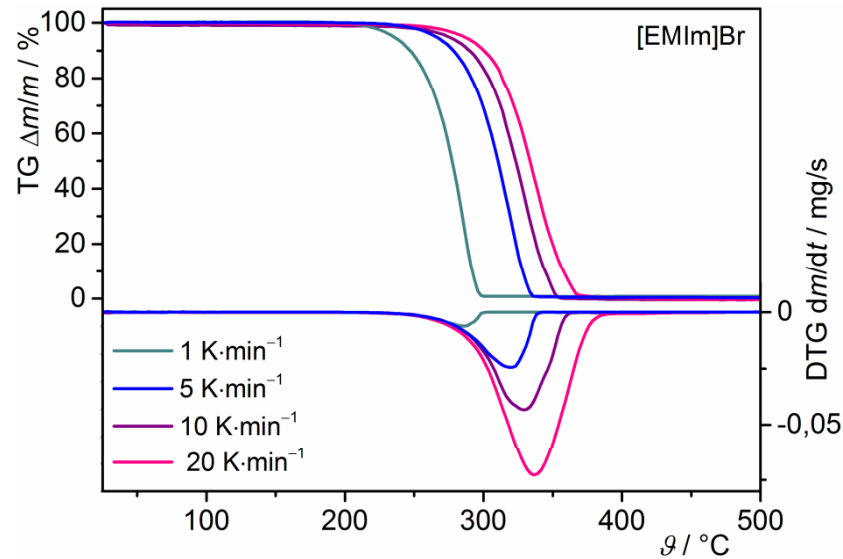


TG-MS



How to evaluate the „real“ temperature of thermal decomposition?

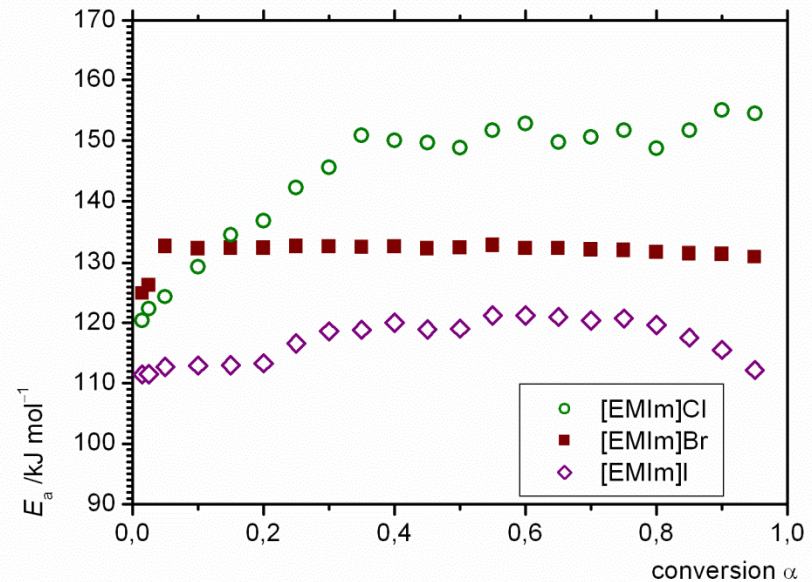


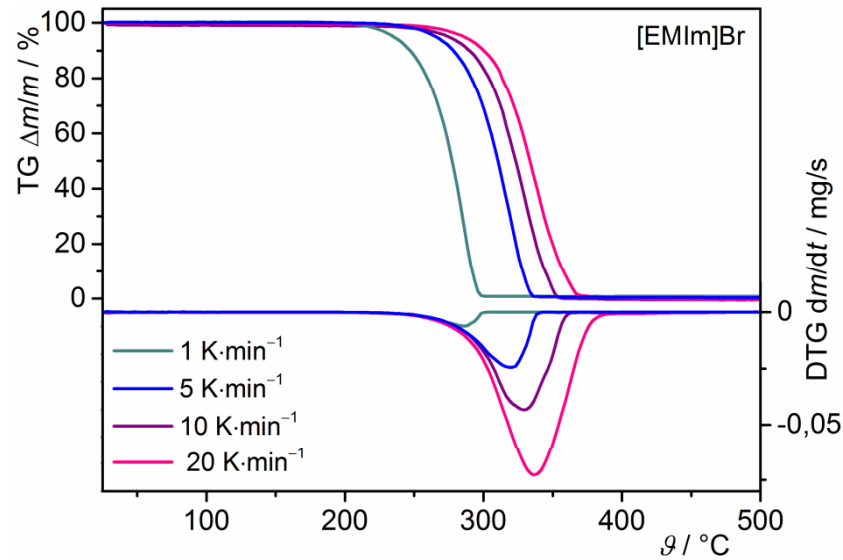


Integral isoconversional method:

heating rate β
vs. temperature T at α

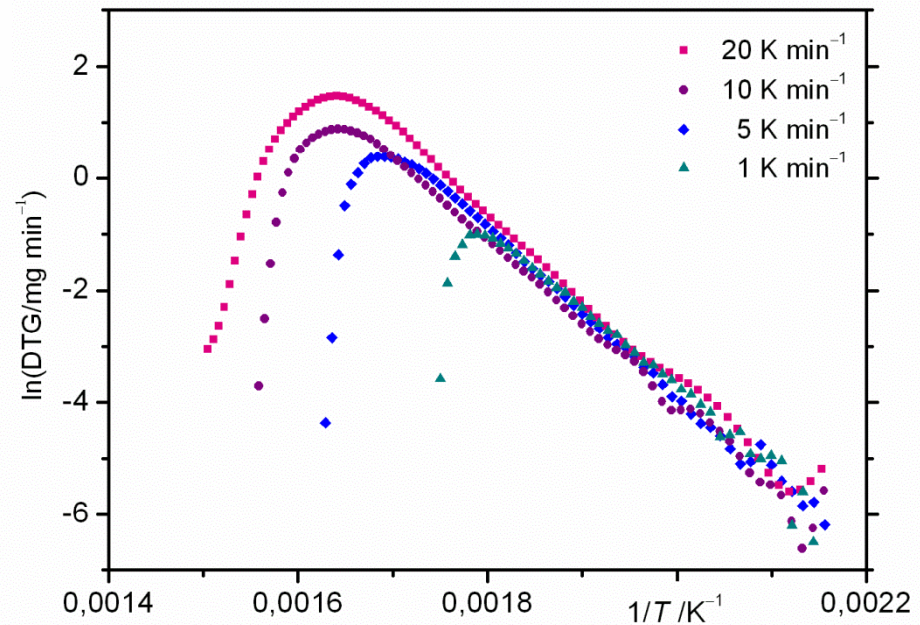
$$\ln\left(\frac{\beta_i}{T_{\alpha,i}^2}\right) = A - \frac{E_a}{R \cdot T_\alpha}$$





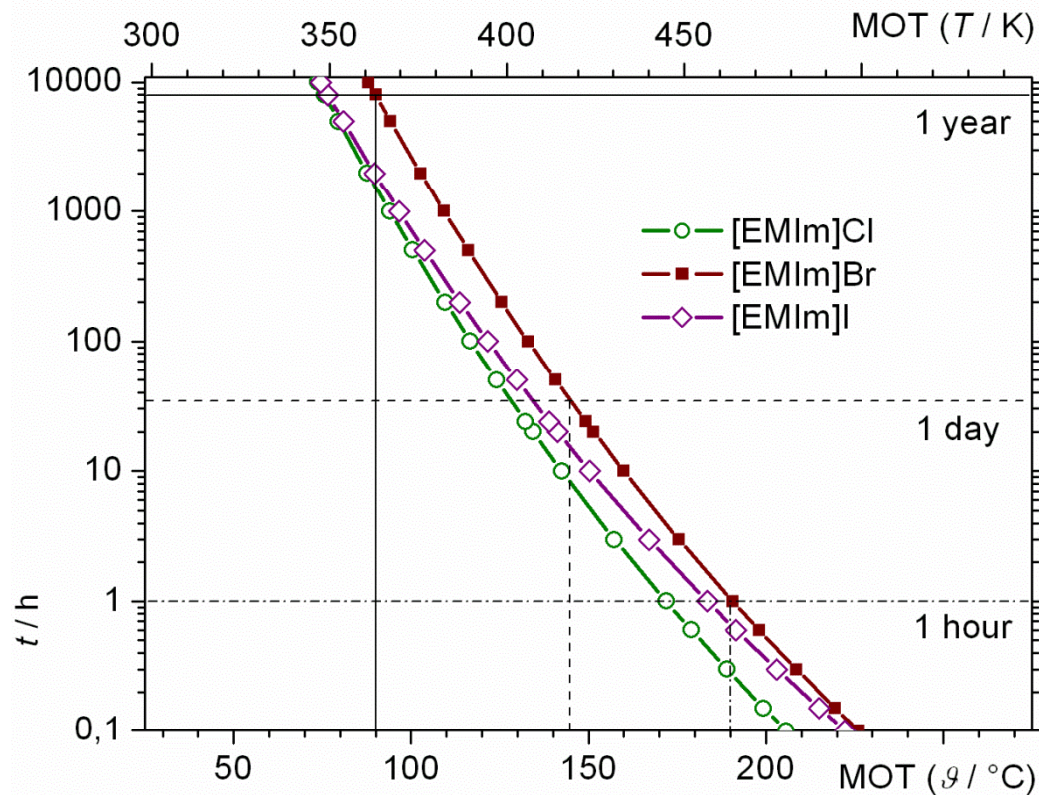
Thermal Decomposition Kinetics

$$\ln\left(-\frac{dm}{dt}\right) = \ln(k_0) - \frac{E_a}{R} \cdot \frac{1}{T} + \ln(m)$$



MAXIMUM OPERATION TEMPERATURE

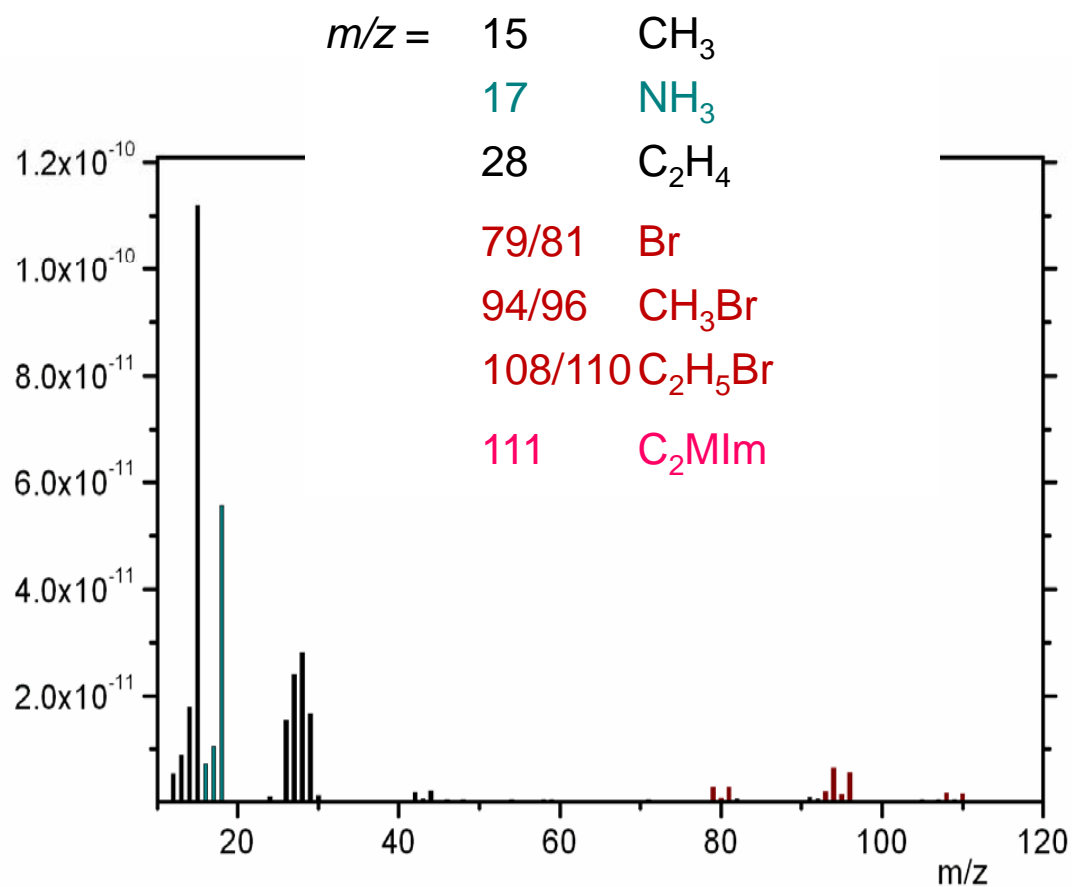
$$T_{max} (MOT) = \frac{E_a}{R \cdot [4.6 + \ln(k_0) \cdot t_{max}]}, \quad (\alpha = 1 \%)$$



[EMIm]X X =	MOT_{8000h} , °C	MOT_{24h} , °C
Cl	76	132
Br	90	149
I	77	139

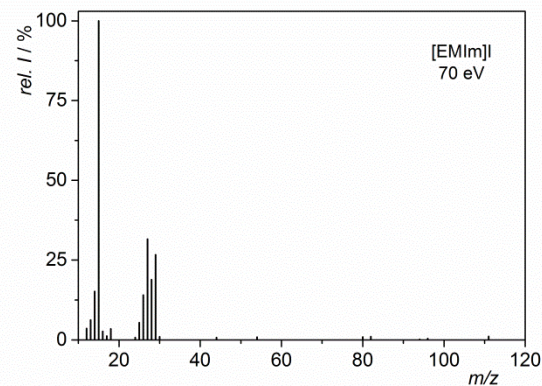
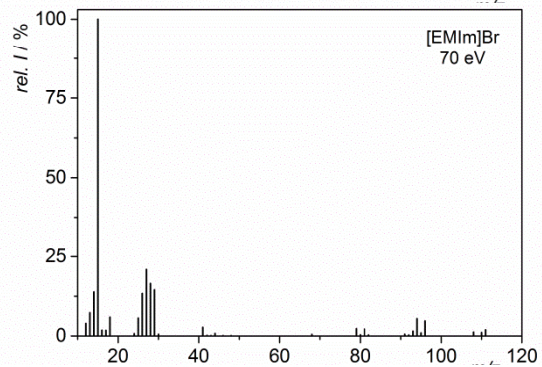
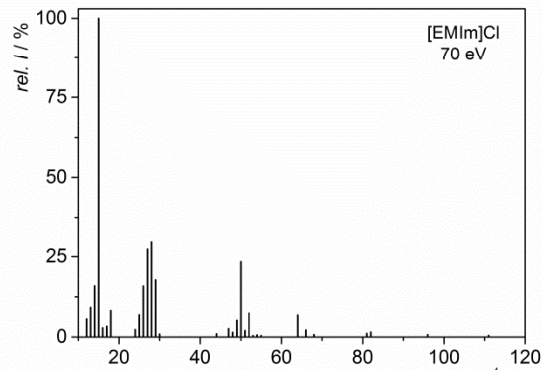
Seeberger, Andresen, Jess,
Phys. Chem. Chem. Phys. **2009** 11 9375.

[EMIm]Br

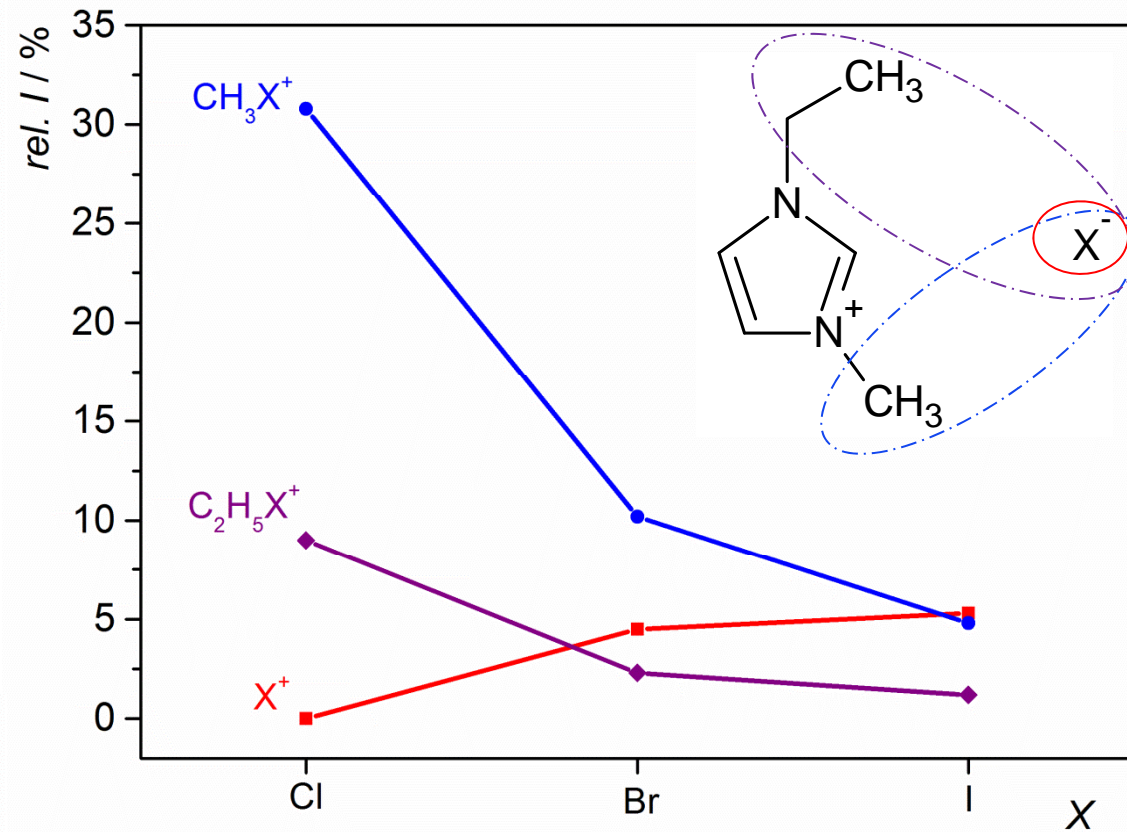


← 50 eV
70 eV
90 eV

=> Halide anion

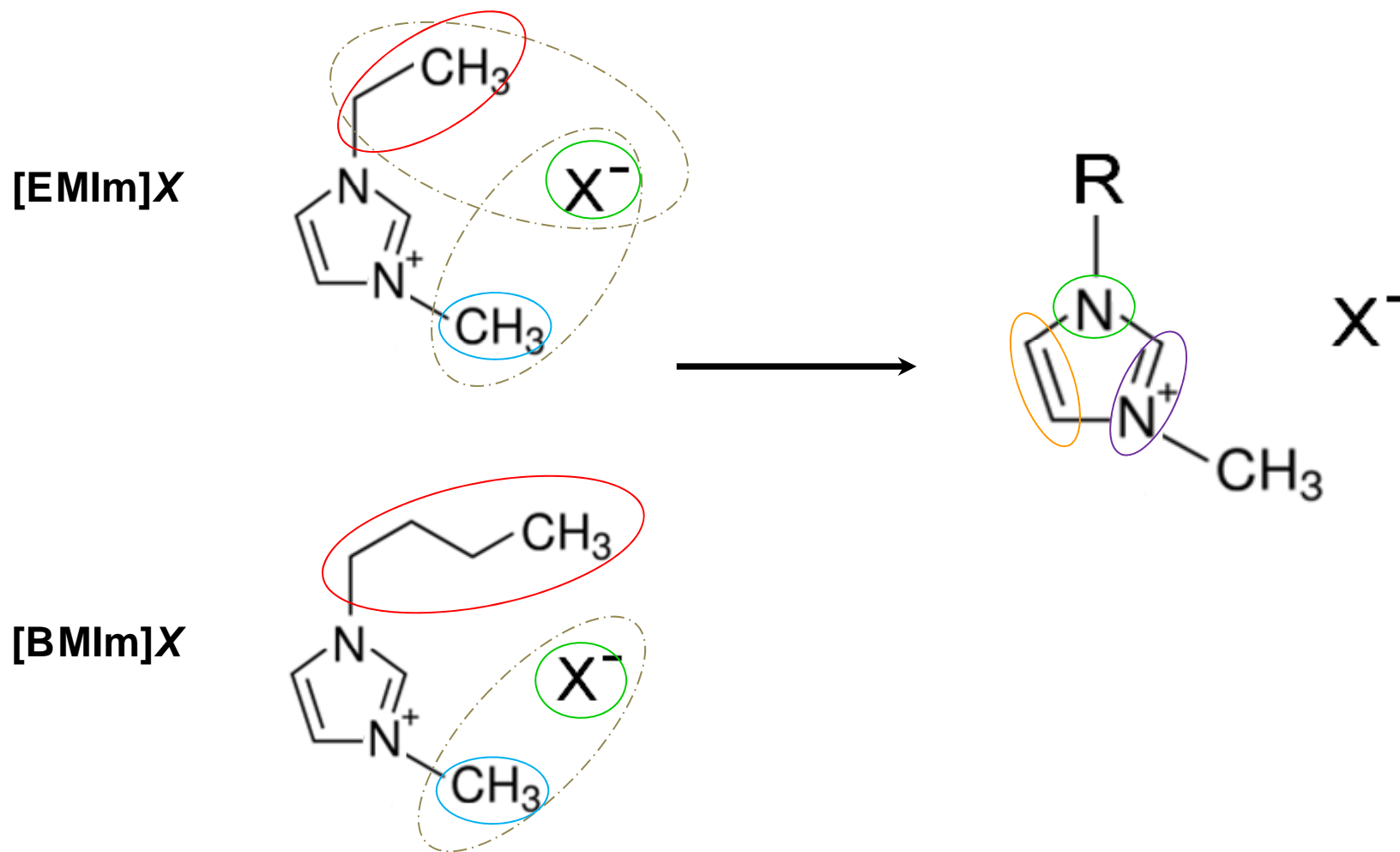


[EMIm]X



Thermochim. Acta **2015**, 604, 129.

=> Chain length



Thermochim. Acta **2013**, 573, 162.
Thermochim. Acta **2015**, 604, 129.



I. Kunert, TU Dresden

A. Efimova, A. Deckwerth, E. Grabitz, G. Hubrig,
L. Pfützner, C. Ruckhaber, BTU C-S



DFG - Priority Program 1708:
Material Synthesis near Room Temperature



European Found for Regional Development
Federal State Brandenburg