

# Micro reaction calorimetry for investigation of phase formation processes in ionic liquid flux systems

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The formation of  $\text{Te}_4[\text{AlCl}_4]_2$  from tellurium,  $\text{TeCl}_4$ ,  $\text{AlCl}_3$  [1] has been used as a model system for the establishment of a new measurement method in ionic liquids (IL) using a micro reaction calorimeter ( $\mu\text{RC}$ , Thermal Hazard Technology).

With the IL flux system 1-butyl-3-methylimidazolium chloride / aluminium chloride as a source material, different compositions and amounts of solid reactants have been added. Thus various sub-reactions could be analyzed, such as dissolution processes, oxidation, and phase formation reaction. Applying the solid addition system the reaction can be analyzed, even if the reaction starts immediately at ambient temperature. Using the micro reaction calorimeter isothermal, time dependent measurements can be realized with distinction of the quantity of different sub-reactions. Finally, the reaction course of various isothermal runs can be evaluated.

As assistant method Raman spectroscopy was applied to identify the reactive species in the system and to get a better insight of the reaction. [2-4]

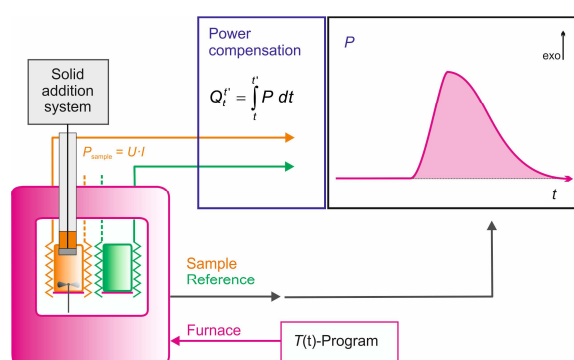


Fig. 1: setup and principle of  $\mu\text{RC}$

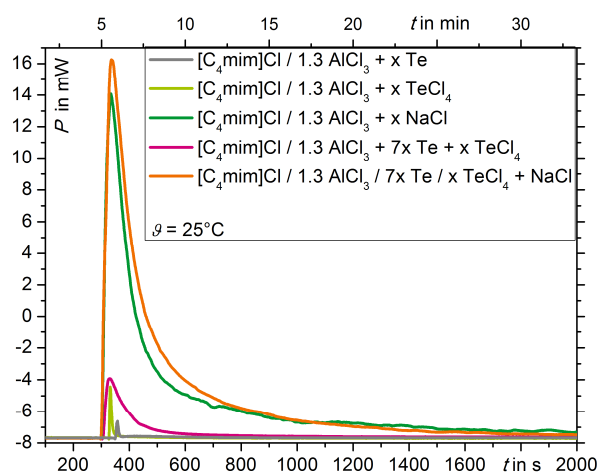


Fig. 2: measurement of heat of reaction with  $\mu\text{RC}$

[1] E. Ahmed et al., *Z. Anorg. Allg. Chem.* **2010**, 636, 2602–2606.

[2] C. J. Dymek et al., *Polyhedron* **1988**, 7, 13, 1139-1145.

[3] W. Brockner et al., *Z. Anorg. Allg. Chem.* **1980**, 461, 205-210.

[4] P. J. Hendra et al., *J. Chem. Soc. (A)* **1968**, 600-602.