Thermomicroscopy as a tool to study the kinetics of consecutive reactions in the solid state.

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In general, the most reliable theoretical explanations of observed kinetic behavior are based on data obtained from different , but complementary, investigative techniques. The necessity of complementing rate studies conducted by conventional thermal analysis (TA) techniques, e.g. TGA and DTA/DSC, with other types of experimental measurements and observations is emphasized with particular stress on the value of microscopic observations. Solid state chemistry possesses the important advantage that it permits reactions to be visually inspected by microscopy. This approach is sometimes, but not invariably, exploited and it must be commended as the most effective and efficient route towards the elucidation of many aspects of the chemistry of solids [1].

Thermomicroscopy (TM) is indispensable in the study of solid state kinetics. First of all, it is essential to interpret kinetic observations with due consideration of the possibility that the material may undergo a loss of structural order at elevated temperature. The melting may be local, temporary or partial within a reacting condensed phase [1]. Secondly, TM observations are also required to supplement conventional kinetic data in the formulation or determination of a reaction mechanism or model [2]. Such model is needed in the mathematical model fitting methods to calculate the kinetic parameters.

Convinced by these benefits and the surplus value of TM in solid state kinetic investigations, we have just started to explore this technique and all of its possibility's. We studied the well-known thermal decomposition reactions of $CaC_2O_4.H_2O$ and $SrC_2O_4.xH_2O$ as well as their 1/1 and 1/2 mixtures by means of an optical metallurgical polarizing microscope equipped with *heating stage*.
With this presentation we will discuss the provisional results and their implementation in the mathematical processing of data from conventional TA techniques.

[1] A.K. Galway, Pure & Appl. Chem., Vol. 67, No. 11, p.1809-1814, 1995.
[2] C.H. Bamford, C.F.H. Tipper, Comprehensive Chemical Kinetics, Vol. 22, Reactions in the solid state, Elsevier Scientific Publishing Company, 1980.