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Applying Avramov's Useful method for analyzing DTA data on overall crystallization kinetics on glass powders; comparing to other methods

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Abstract: We follow the development and experimental testing of Avramov's method for analyzing from DTA and DSC studies of crystallization at constant heating rate q. We first present the theoretical work of Avramov and Avramova, where it is demonstrated that a straight line is expected in *log-log* coordinates when the heating rate, $log\ q$ is plotted against the peak temperature, $log\ T_p$. The slope of this line is proportional to the dimensionless activation energy of the process, E. The Avrami parameter, n, is then obtained using the maximum slope of the experimental integral sigmoid curve, where experimental data is most accurate. This approach is recently used in an experimental work by Avramova and Karamanov to analyze data from DTA studies on powdered, sieved to different size fractions glass. The results, achieved with Avramov's method are compared to results of analyzing the same data with other methods. Data from two types of fractions – narrow fractions, bonded in some size interval and wide fractions, where only the upper size limit is set are studied. In the course of this study we also find a drift in the value of the overall transformation degree,, corresponding to the DTA crystallization peak. These values vary according to size fraction and also to to the type of fraction and it tends to be higher for the narrow fractions than for the corresponding wide ones.