PROJECT "THEORY AND APPLICATIONS OF SINTER-CRYSTALLIZATION" DN 19/7

Is the good (sigmoid) fit enough to implement the "true" kinetics when modelling quasi-2D crystallization in glasses?

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Abstract: My talk is focused on the attempt to model (fit) the time dependence $\alpha(t)$ of the transformation ratio α obtained from experiments[1] on Ta_2O_5 atomic-layer-deposited. I confront the results from the originally used model of Johnson, Mehl, Avrami and Kolmogorov, $\alpha = 1 - \exp\left(-\left(t/\tau_{JMAK}\right)^n\right)$ that contains two parameters – a time-scale[2] τ_{JMAK} and the so called Avrami exponent *n* using two other models. One with a parameter more – a general model used in the theoretical biology, the so called Richards model[3] (which has as a special case the logistic function see[4] and the references therein), and one with a parameter less, obtained *ad hoc* using the approach of Nanev et al[5] in which the normal velocity is proportional to the expiring supersaturation. Obtaining good fits of the integral curve is tempting to discuss the crystallization kinetics based on the differential curve, the velocity of transformation $d\alpha/dt$. Showing the ambiguity of the interpretations, I propose also some ways out based on classical ("Avrami coordinates") and modern approaches – the theory of nonlinear systems and chaos.

This talk is dedicated to the memory of Iwan Gutzow and Isak Avramov.

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