Accepted Manuscript

Title: Non-equilibrium fast thermal response of polymers.

Authors: Alexander A. Minakov, Christoph Schick

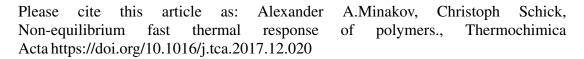
PII: S0040-6031(17)30330-1

DOI: https://doi.org/10.1016/j.tca.2017.12.020

Reference: TCA 77902

To appear in: Thermochimica Acta

Received date: 9-10-2017 Revised date: 14-12-2017 Accepted date: 17-12-2017



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Non-equilibrium fast thermal response of polymers.

Alexander A. Minakov a and Christoph Schick b,c

- ^a A.M. Prokhorov General Physics Institute, Vavilov st. 38, 119991 Moscow, Russia;
- ^b University of Rostock, Institute of Physics and Competence Centre CALOR, Albert-Einstein-Str. 23-24, 18051 Rostock, Germany.
- ^c Kazan Federal University, 18 Kremlyovskaya Street, Kazan 420008, Russian Federation

Graphical abstract:

Non-equilibrium thermal response of polymers is described by the linear differential equation with dynamic heat capacity $c_{dyn}(t)$, which depends on the spectrum of the relaxation time τ_0 . Thermal response for few definite relaxation time constants τ_0 is presented in the graph. Next, the response $T(t,r,\tau_0)$ can be averaged over the relaxation time distribution function, which in turn can depend on temperature.

$$\frac{\partial}{\partial t} \int_{0}^{\infty} \rho c_{dyn}(\tau) \frac{\partial}{\partial t} T(t-\tau, \mathbf{r}) d\tau = \lambda \Delta T(t, \mathbf{r}) + \Phi(t, \mathbf{r})$$

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