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Glass transition in ultra thin polymeric films measured by differential AC-Chip calorimetry H. HUTH, A. MINAKOV, C. SCHICK, University Rostock, Institute of Physics, Uniplatz 3, 18051 Rostock, Germany — The film thickness dependency of glass transition in polymer films is still controversially discussed. For different experimental probes different dependencies are observed and a generally accepted link to molecular mobility is not yet established. Calorimetry has proven to provide useful information about glass transition, because it establishes a direct link to energetic characterization. In several cases a direct comparison with results from other dynamic methods like dielectric spectroscopy is possible giving further insights. For thin films in the μm... nm range standard calorimetric methods are mostly not applicable. In the recent years there are new developments in the field of calorimetry which overcome these limitations. We set up a differential AC-chip calorimeter capable to measure the glass transition in nanometer thin films with pJ/K sensitivity. Changes in heat capacity can be measured for sample masses below one nanogram even above room temperature as needed for the study of the glass transition in nanometer thin polymeric films. The glass transition in thin films was determined at well defined experimental time scales. No thickness dependency of the glass transition temperature was observed within the error limits - neither at constant frequency nor for the traces in the activation diagrams.

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