OP-15-1339

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Room: Reda 2

POLYMER CRYSTALLIZATION DATA AT PROCESSING RELEVANT COOLING RATES FOR MORE REALISTIC PROCESS MODELING

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Many materials are created or used far from thermodynamic equilibrium. Knowledge about the phase transitions on fast cooling is therefore required. Calorimetry is a powerful tool in this respect and it takes a special place among other methods. In addition to its simplicity and universality, the energy characteristics (heat capacity Cp and its integral over temperature T - enthalpy H), measured via calorimetry, have a clear physical meaning. Fast scanning calorimetry, especially on cooling, allows for the in situ investigation of structure formation, which is of particular interest in a wide range of materials like polymers, metals, and pharmaceuticals to name a few. Crystallization temperatures, enthalpies, or width of the transitions obtained at processing relevant cooling rates may provide more realistic input parameters for polymer processing modeling. Free standing silicon nitride membranes are commonly used as low addenda heat capacity fast scanning calorimetric sensors. The gauges consist of a film-thermopile and a film-heater which are both located in the central part of the membrane. At non adiabatic conditions controlled fast cooling up to 106 K/s is possible in addition to fast heating at the same high rates. E. Zhuravlev, C. Schick, Fast Scanning Power Compensated Differential Scanning Nano-Calorimeter:

1. The Device & 2. Heat Capacity Analysis, Thermochim. Acta, DOI 10.1016/j.tca.2010.03.020 & 10.1016/j.tca.2010.03.019 (2010).