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Heat Capacity Measurements by Simultaneous Relaxation and AC-Calorimetry H. KASHURI, K. KASHURI, G.S. IANNACCHIONE, WPI — A high-resolution method for measuring the heat capacity C_p using simultaneously AC and Relaxation Calorimetry techniques has been developed. This technique is useful for both first and second-order phase transitions of liquids and complex fluids. The difference of the C_p's measured by the Relaxation and AC calorimetry is a direct measurement of a phase transitions' latent heat. As a test, the C_p of two cyanobiphenyl liquid crystals, 5CB and 8CB, were measured using a square wave modulation pulse train over a base temperature range from 300 to 320 K in which 5CB exhibits a first-order phase transition and 8CB exhibits a first and second-order phase transition. Fourier transform analysis allows for the direct C_p measurement at the fundamental frequency of the square wave pulse train (as well as higher frequency orders) as function of temperature (i.e., AC-mode). The heating and cooling relaxations at the beginning and end of the square pulse heating allows for a relaxation analysis of C_p by applying the dual slope-method that includes all enthalpic conversions.

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