

Light Scattering Detection of Phase Transitions in Paraffin Wax Nanoemulsions

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Paraffin waxes are important for the industries of food, paper, cosmetics, household chemicals, fossil fuels, and alternative energy. Static and dynamic light scattering is commonly adopted to measure the size of emulsions and suspensions as well as the polymer molecular weight in solution. We used light scattering jointly with other analyses to obtain information about thermodynamics and dynamics of phase transitions in paraffin nano-emulsions (~100 nm size). In particular, we investigated the phase transition temperature range for several n-alkane ($C_{19}H_{40}$, $C_{20}H_{42}$, $C_{21}H_{44}$, $C_{23}H_{48}$, and $C_{28}H_{58}$) nano-emulsions without surfactant and combined the study with other techniques. Different phases of paraffin wax confined in nanoemulsions have been identified and compared with the literature data for bulk systems. Hysteresis in the phase transitions upon heating and cooling has been investigated and discussed.