Fluorescent excitation transfer as a tool for the phase transition studies
ALEXEI GOUN, Postdoctoral researcher — The use of the fluorescent res-
onant excitation transfer technique (FRET) to study the phase transition kinetics
is demonstrated. The laser temperature jump is applied to the water/2,6-lutidine
mixture and causes the demixing. Coumarin 480 and hydroxypyrene laser dyes form
excitation transfer that interrogates the spatial structure of the system. Due to the
differential solubility of these dyes in the components of the mixture, the excita-
tion transfer ceases once the phase separation occurs. The spatial resolution of the
method is determined by the Forster distance of the excitation transfer pair, and in
this case is equal to 3 nm. The phase separation is completed within 1 microsecond.
The rising edge of the fluorescence is consistent with polynomial growth of the phase
separated domains, and not with Cahn-Hilliard fixed length instability. The theo-
retical model for the excitation transfer in a variety of systems such as separation of
binary mixture, phase reorganization of membranes, formation of lamellar structure
is developed.