Abstract

In consideration of the climate change and the limitation of fossil energy resources it is of the utmost importance to improve the energy efficiency of insulating materials. In the case of well-established, microporous polyurethane (PUR) foams, the thermal insulation could be improved by reducing the pore size to approximately 100 nm. With the aim of providing such nanoporous foams STREY et al. designed POSME, the principle of supercritical micro-emulsion expansion. The central idea of this procedure is the expansion and fixation of microemulsions which contain a supercritical fluid as their nonpolar component. As there are processes of aging – such as coagulation, coalescence and OSTWALD-ripening – which are responsible for the coarsening of foam, a new strategy has to be developed to prevent aging. Within this thesis different approaches have been made to improve the POSME-procedure concerning PUR-foams are presented. It has been demonstrated that aging processes could be reduced by using methyl dodecanoate and phenyltris(trimethylsiloxy)silane as co oils (*Anti-Aging-Agent*, short *AAA*) and phyllosilicates as diffusion barriers in newly developed polyol microemulsions. An economical and environmentally friendly alternative to fluorinated hydrocarbon and silicone surfactants has been found by applying newly synthesized surfactants combining polyol and surfactant or isocyanate and surfactant.