Microemulsions with Renewable Feedstock Oils

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To investigate the influence of the chemical structure of renewable oils on the domains of existence and nanostructure of microemulsions we have chosen to study the pseudo-ternary system water/SDS/1-Pentanol/renewable oil. The domains of existence were determined by recording pseudo-ternary phase diagrams with a mixture of SDS/1-Pentanol as pseudo component in a constant mass ratio of 1:2 and limonene and/or rapeseed biodiesel as renewable oil. The nanostructures of the formulated microemulsions were studied using conductivity measurements. All the results were compared to those obtained with n-alcanes with a chain length between 6 and 16 as the oil component.

We can show that the use of limonene gives a phase diagram similar to the one obtained with octane or nonane. The domain of existence of the microemulsion found with rapeseed biodiesel is more like the one observed in presence of hexadecane. By mixing both oils we were able to screen more or less the whole spectrum of phase diagrams beginning with octane and ending with hexadecane. For this reason we examined the phase diagrams for the limonene-to-biodiesel mixtures with the mass ratios 1:3, 1:1 and 3:1 further to those with pure components. For the behavior of the oil not the hydrophobicity plays an important role on the domain of existence of the microemulsion but the number of carbon atoms in the molecule. The ultimate goal of this study is the proposition of “green” alternatives to alkanes that are still widely used in product formulations.