Effect of fluorinated alcohols on the solubility of AOT in supercritical carbon dioxide

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The effect of co-solvents which possess different CO_2-philic tail length and the number of fluorine atoms on the solubilities of AOT and on the formation of water-in-supercritical CO_2 ($W/scCO_2$) microemulsions has been investigated at various temperatures and pressures using 2,2,3,3,4,4-heptafluoro 1-butanol (F-butanol), 2,2,3,3,4,4,5,5-octafluoro 1-pentanol (F-pentanol) and 3,3,4,4,5,5,6,6-nonafluoro 1-hexanol (F-hexanol) as co-solvents. The conditions to show homogeneous phase have been determined for the mixtures containing surfactant, fluorinated alcohols, water and $scCO_2$. In AOT/co-solvent/CO_2 ternary mixtures the cloud point pressures (CPPs) have been measured at temperatures between 38℃ and 80℃. Increasing the number of fluorine atoms the CPPs of ternary mixtures show lower values especially for F-hexanol. Comparing CPPs of AOT/F-hexanol/CO_2 with those of AOT/F-butanol/CO_2 we can observe 40~50 bar decrease of CPPs when F-hexanol has been used as co-solvent. When we add water into ternary mixtures, the microemulsions of AOT/co-solvent/water/CO_2 have been formed and the CPPs have been measured by changing water to surfactant ratio(Wo) between 5 and 10.