

Stability of perfluorinated homopolymer surfactant/water/carbon dioxide system:
Effect of chemical structure of perfluorinated homopolymer

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W/C microemulsions can be considered as a new type of green medium for dissolving polar compounds or metal species in supercritical carbon dioxide. Recently, several surfactants including a fluorocarbon-hydrocarbon hybrid surfactant and amphiphilic block copolymer surfactant with hydrophilic part and CO₂-philic part have been shown to dissolve in CO₂. However, these surfactants are obtained through complex and difficult processes. In the present work, we proposed perfluorinated homopolymers, PMA-R_f, PMMA-R_f, PEO-R_f and PS-R_f as surfactants in W/C microemulsion. To confirm possibility as surfactants in W/C microemulsion, we carried out phase behavior measurement using variable volume view cell for CO₂ + H₂O + surfactant system with varying molar ratios of water to surfactant (w_o). And dispersion polymerization of PMMA, PVP and PVCL was performed in scCO₂ using PMA-R_f, PMMA-R_f, PEO-R_f and PS-R_f as surfactant to find out relation and difference of role as surfactants in W/C microemulsion and in dispersion polymerization, respectively.