

FLUORO ACRYLIC POLYMERS AND COPOLYMERS: SURFACE PROPERTIES AND THERMAL BEHAVIOUR

C. Guéry, T. Hugues, N. Kotea, M. Viguier and A. Commeyras
 Laboratoire Hétérochimie et Amino-acides, URA-CNRS 1097,
 U.S.T.L. Place E. Bataillon, 34060 Montpellier Cédex (France)

The wetting properties and thermal behaviour of a series of polyacrylates containing pendant perfluoroalkyl groups $R_F = C_n F_{2n+1}$ where n is 4, 6 and 8, have been studied. Polymerisation of fluoro acrylic monomers $CH_2=C(CH_3)COO-R_H-R_F$ (R_H is a non fluorinated spacer $R_H = -CH_2-CH_2-$, $-CH_2-CH(OH)-CH_2-$, $CH_2-CH=CH-$) and copolymerisation with methacrylic esters (methyl, butyl,...) are carried out in solution or emulsion with azo compounds as radical initiators.

Reactivity ratios implied a random distribution of fluoro acrylic units in the copolymer chains.

Surface tensions (γ_C and γ_S) of copolymers are discussed in relation to the composition and the nature of the fluorinated monomer and comonomer. The wettability of copolymers is markedly decreased by the presence of few percents of fluoro monomer and by the length of the fluoroalkyl side chain from $n=4$ to $n=8$.

The results presented here support the view that the concentration of fluoroalkyl groups is higher at the interface solid/air than in the bulk, the packing of these fluoro groups control the wettability of the surface.

The association and arrangement of fluoroalkyl groups are confirmed by DSC studies. Homopolymers with $R_F = C_8 F_{17}$ presented an endothermic peak around $80^\circ C$, at this temperature we observed the disappearance of optical birefringence (exothermic peak of cristallisation is observed on cooling). We assumed that this first-order transition corresponds to the melting of fluoro side chains.

Melting temperatures and enthalpies are modified by the thermal history of the polymer (quenching, annealing) and their chemical structure.

A second transition, with a longer relaxation time is observed, around $60^\circ C$.