Molecular Organization in Langmuir Films of a Dichroic Azo Dye-Liquid Crystal Mixture. I. Thermodynamic Data and BAM Observations

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Two-component films of 4-octyl-4'-cyanobiphenyl (8CB) and a nonamphiphilic azo dye on an air-water interface have been studied by means of surface pressure-area (π-A) isotherm measurement, Brewster angle microscopy (BAM), and absorption spectroscopy. Conventional Langmuir technique was used to form **1**/8CB (guest-host) films during compression and expansion of an area occupied by the molecules. The pure dye, spread on the air-water interface, formed irregular three-dimensional structures (3D), visible by the naked eye. In **1**/8CB films the dye was distributed homogeneously only at low mole fraction. At mole fractions higher than 0.3, just after spreading the **1**/8CB solution at the interface part of **1** formed 3D structures. On the basis of π-A isotherm, information about the miscibility of the two components in the **1**/8CB mixtures was obtained by using the area additivity criterion and surface phase rule. BAM images allowed to draw conclusions on the molecular organization of mixed Langmuir films at the air-water interface. The presence of **1**, roughly up to a mole fraction of 0.5, causes the mixed film to be less compressible and more thermodynamically stable (with higher collapse surface pressure). The absorption spectra of the films of **1**/8CB mixtures revealed the formation of dye aggregates.

Key words: Azo Dye; Liquid Crystal; Langmuir Film; Brewster Angle Microscopy; Light Absorption Spectroscopy.