

Structure in Microemulsions using Freeze-Fracture with Atomic Force Microscopy

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A new technique is presented devoted to obtaining the microstructure in microemulsions and lyotropic liquid crystals. In this technique, microemulsion samples are pre-frozen at the temperature of liquid butane and then taken into liquid nitrogen. In a special device, the sample is introduced into an atomic force microscope specially designed, where the sample is maintained at the temperature of liquid nitrogen and in high vacuum. After that, the sample is fractured and scanned using intermittent contact and phase lag modes, to obtain topographic and phase images. We have studied several systems (AOT/water, C12E5/water, CTAB/water, and SDS/water) that formed different supramolecular structures, with important results. In particular, in the case of lamellar phases, the lamellar structures were clearly observed.