MS01.09.03 NEUTRON SCATTERING STUDIES OF NEAR SURFACE EFFECTS ON STRUCTURES IN SURFACTANT SYSTEMS. W. A. Hamilton, P. D. Butler, J. B. Hayter, Oak Ridge National Laboratory*, Oak Ridge, TN 37831, USA, L. J. Magid, Z. Han, Department of Chemistry, University of Tennessee - Knoxville, Knoxville, TN 37996-1600, USA

The presence of a solid surface can be expected to modify nearby surfactant structures in solution both statically, due to the constraints imposed by its presence and interactions with any adsorbed layer, and dynamically, by Poiseuille shear in flow past it. Using neutron reflectometry, near-surface small angle neutron scattering (SANS) from reflection geometry cells, and bulk SANS from both static and Couette sheared samples, we have attempted to track the evolution of surface structures into bulk structures over distance from the solid-liquid interface. The most dramatic results of these investigations has been the observation of a system highly extended threadlike micelles under Poiseuille shear flow near a quartz surface ordering into a hexagonal phase. This phase so strongly oriented with respect to the flow direction and the shear gradient that its "crystallites" have mosaic widths of only a few degrees, but Couette shear SANS measurements show that this very highly oriented region may not extend more than a few tens of micron from the surface into the bulk shear field. We also present results of this approach applied to near surface ordering in spherical micellar and multilamellar surfactant systems.

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MS01.09.04 INTERFACES AND THIN POLYMER FILMS AS SEEN BY X-RAY AND NEUTRON REFLECTIVITY TECHNIQUE. Manfred Stamm, Max Planck-Institut für Polymerforschung, Postfach 3148, 55021 Mainz, Germany

Interfaces between compatible or incompatible polymers play an important role for the understanding of polymer blend properties and adhesion. They are investigated by neutron reflectivity with a resolution of the order of 1nm/1, 2/, where a contrast between components is generated by selective deuteration. Specific examples are discussed including the very early stages of the interdiffusion of compatible polymers at an interface as well as the formation of a narrow interfacial region between strongly incompatible materials, where the interface width depends on compatibility, molecular weight and temperature. Also the interfacial segregation of a compatibalizer such as a diblock copolymer can be followed choosing a suitable contrast against the homopolymers.

X-ray reflectivity on the other hand reveals information on structural aspects within thin films and at the surface/3/. An example is the development of steps at the surface of a combined liquid crystalline polymer during the evolution of smectic order within the film, where the smectic layers are ordered parallel to the surface depending on film thickness. Those reflectivity experiments should be complemented by other investigations as for instance atomic force microscopy, which provides also a lateral resolution.

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/2/ M. Stamm, D.W. Schubert, Annu.Rev.Mater.Sci *25* (1995) 325
/3/ G. Henn, H. Poths, M. Stamm, Polymers for Adv. Techn. *5* (1994) 582.

MS01.09.05 POLARIZED NEUTRON REFLECTOMETRY WITH POLARIZATION ANALYSIS: AN ULTRA SENSITIVE TOOL FOR THE MAGNETISM OF THIN FILMS. C. Fermon, DRECAM/SPEC, C.E.A Saclay, 91191 Gif/sur/Yvette cedex FRANCE

The polarization analysis gives a vectorial measure of the magnetization in the plane of a thin film. From reflectivity profiles obtained for each state of the incident and reflected neutron spin, it is possible to rebuilt the vectorial magnetic depth profile of multilayers and thin films. The quality of information obtained in thin films is in fact much better than multilayers because there is no averaging and no decrease of the signal. The sensitivity is very high: we can measure the magnetization of a single monolayer with less than 0.05mB per atom. For theoretical simulations we take into account different effects: external magnetic field, neutron precession... usually neglected but important in the case of non colinear moments in the layers [1]. I shall describe a new reflectometer with spin analysis PADA built on the Orphée reactor LLB, France. I shall present several examples which show clearly the sensitivity of the method. Spatial correlations and non specular relflectivity will be also discussed.

MS01.09.06 OFFSPECULAR SCATTERING FROM OPTICAL GRATINGS. J.R.P. Webster, A. Zarbakhsh, R.M. Richardson, ISIS, Rutherford Appleton Laboratory, UK and Department of Chemistry, Bristol University, UK

Following after Tolan et al we have looked at the offspecular scatter from a series of optical gratings using both a 1 and a 2 dimensional multidetector. The Bragg reflections obtained from these systems occur at values of $q_x=2\pi/dx$ where dx is the periodicity in the scattering plane parallel to the interface. The limiting value of dx, which is related to the coherence length of the neutron beam, was found to be of order 40 microns.

PS01.09.07 NEW MULTIDETECTORS AND MONOCHROMATORS ON ILL NEUTRON POWDER DIFFRACTOMETERS P. Convert, P. Radaelli and A. Hewat, Insititut Laue-Langevin, BP 156X Grenoble Cedex 9, 38042 FRANCE

A large position sensitive detector using the micro-strip on glass substrate technology has finally been constructed for the new ILL D20 powder diffractometer, while the old D1A diffractometer has been upgraded with a 150° multidetector. A new multi-wafer monochromator has been installed on the high resolution machine D2B.

Multidetectors and monochromators are very important in making the maximum use of the limited neutron flux even on the high flux ILL reactor. Certainly, improvements to these technologies are much more cost effective than the construction of new neutron sources.
The D20 detector subtends a solid angle comparable to that of the best time-of-flight machines, but the time-averaged flux on the sample is higher. This means that either very small powder samples (mg) can be studied, or that chemical kinetic experiments can be performed on time scales of ~seconds.

The 150° multidector on D1A, combined with a new focussing mono-chromator, means that this instrument can continue to serve as a 'work-horse' for high resolution Rietveld refinement. The new control and data treatment systems, using Silicon Graphics workstations, allow immediate analysis and visualisation of the results.

ILL has now refined the BNL multi-wafer monochromator technology, having constructed a special hot-press furnace for wafer fabrication. The first such monochromator, on the high resolution diffractometer D2B, focusses a 300 mm neutron beam onto a 50 mm sample, resulting in high intensity while maintaining the very regular line shape needed for Rietveld refinement. The new ILL monochromator allows different wavelengths to be selected (1Å, 1.6Å, 2.4Å, 6Å) from different [hhl] planes, something not possible with earlier multi-wafer designs.

Further details of these and other developements in neutron diffraction at ILL are to be found on **http://www.ill.fr/dif/**