Applicability of Freeze-Fracture and Cryo-TEM to Complex Liquids

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Traditional methods of sample preparation and analysis in conventional transmission electron microscopy (TEM) are not readily applicable to multicomponent complex liquids which may contain a wealth of microstructural information. Two techniques which facilitate the study of structure in such liquids are freeze-fracture (FF) TEM and cryo-TEM.

FF/TEM has been exceptionally valuable in probing the ultrastructure of biomembranes. The principles behind FF/TEM can be easily extended to study the morphological details of various structures in complex liquids. Vitrified specimens are fractured at low temperature and under high vacuum to produce surfaces which are replicated and examined. We have had tremendous success in characterizing multilamellar vesicles and sheets with this technique.

When the microstructural elements are sufficiently small, cryo-TEM is used to image the elements *in situ*. The liquid forms a thin film on a TEM grid and is rapidly cooled and transferred to the microscope under cryogenic conditions. Small-scale structures such as micelles, vesicles, and lipid sheets, have all been successfully visualized with cryo-TEM.

Information regarding colloidal microstructure is necessary in understanding the rheological and stability properties of various complex liquids. Cryo-TEM and FF/TEM are essential analytical tools for developing structure-property relationships.

CONTEST RESULTS

In the last issue of this newsletter, sort of as a space-filler, we announced a contest. The first question of this contest was what is the most common last name in our mailing list of over 9,500 individuals with an interest in microscopy in the U.S.? The second question was how many are there with that name?

The prize of a $50 U.S. Savings Bond would be awarded to the individual who correctly answered the first question and came the closest on the second. The winner is Ms. Dawn Hommes (Abbott Labs, Abbot, IL) who picked the number of "Smiths" at 55 and her $50 U.S. Savings Bond is on its way. The last names, and number, of the highest ten last names on our list are as follows:

Smith	57	Anderson	29
Johnson	47	Lee	28
Miller	41	Jones	27
Brown	38	Williams	27

One of the first indications of a really bad day is when one must use their Mastercard to pay off their Visa Card balance.