

КОЛОКВИУМ „АЛЕКСЕЙ ШЕЛУДКО”
СЕКЦИЯ „ПОВЪРХНОСТИ И КОЛОИДИ”
ИНСТИТУТ ПО ФИЗИКОХИМИЯ НА БАН

С Ъ О Б Щ Е Н И Е

На **03 юли 2015 г. (петък)** от **11:00 часа** в зала „Болцман” на ИФХ-БАН, ще се проведе заседание на Колоквиума със следния дневен ред:

1. Доклад на Николай Панчев на тема:

„A New Method for Electro-Optical Studies of Water-in-Oil Emulsion Films: Development and Application”

Water-in-oil emulsions (W/O) are common in various industries. In some fields such as cosmetics their stability is desired, while in petroleum industry these emulsions pose a serious problem. Stability of these emulsions depends to a great extent on properties of thin oil films that separate water droplets. It is now generally recognized that the thinning of films and their resistance to rupture play a crucial role in determining the stability of emulsions. To date, the studies on water-in-oil emulsion films are few and present scarce information on the film structure and stability. Application of electric potential on such films is yet another approach to elucidate fundamental science aspects of electro-coalescence of emulsion systems. Based on existing Film Pressure Balance Technique we have developed a new method for studying properties of thin oil emulsion films, which combines AC or/and DC polarization with the optical microinterferometry. This method should help us understanding the actual mechanisms underlying droplet-droplet coalescence that has been unclear so far. The major advantage of this technique is that within a single experiment it is possible to determine independently the most important film parameters: film thickness, film diameter, rate of film drainage, critical voltage of film rupture, film capacitance. Here we report first results that were obtained on films stabilized by model surfactant (Abil), pure natural surfactant (Lecithin), crude oil indigenous surfactants (Asphaltenes) as well as different type of complex natural bitumen (light and heavy fractions). DC voltage ramps experiments were implemented for different surfactant concentrations, organic solvents, film areas, equilibrium film thicknesses. Thus the influence of these factors on film stability (critical voltage) is assessed individually. The actual mechanism of rupture for Abil stabilized decane films is revealed. The suggestion for the rupture mode of black (very thin) and grey (thicker) films has been made based on experimental evidences. It has been revealed that the mechanism of film rupture for Abil stabilized decane films is due to current leakage. Further the disjoining pressure/thickness isotherms are implemented at different DC potentials. The application of DC voltage polarization shifts the isotherms and thus the surface forces are to be affected. Ability to control film diameter reveals contribution of film thickness change to development of capacitance for non-equilibrium film. We believe that the new method promises a lot of novel perspectives for complete study of emulsion films for fundamental and practical purposes.