Speaker：Prof. Vinod Aswal (Bhabha Atomic Research Centre)

Title：Probing Structure and Interaction in Multi-components Soft Matter Using Small-angle Scattering

Abstract:

Small-angle scattering involving neutrons (SANS) and X-rays (SAXS) are widely used as low Q technique for probing the structure and interaction of materials at mesoscopic (1-100 nm) length scale. One of the unique advantages of small-angle scattering is that there are different ways to vary the contrast to study complex systems. Due to differences in the interaction of neutrons and X-rays with matter, these techniques provide complementary information on the system. Neutrons are sensitive to low Z elements, whereas X-rays has high sensitivity to high Z elements. Thus, combination of neutrons and X-rays can be used to probe both the low and high Z elements in a system. The fact that the neutron scattering length is very different for hydrogen and deuterium, isotopic contrast variation SANS is an ideal technique for studying the structural aspects of many hydrogenous systems. The contrast between the particle and the medium can be easily enhanced deuterating either the particle or the medium. The multi-components systems are simplified to study them by selectively contrast matching the components with the partial deuteration of the components. In addition, the magnetic interaction of neutron with the matter can be utilized to study the magnetic systems to characterize magnetic structure along with the nuclear structure. With synchrotron X-rays, anomalous small-angle X-rays scattering (ASAXS) is used to vary the contrast of neighboring Z element (otherwise have very similar contrast) by systematically varying the energy of the incident X-rays near the absorption edge of one of the elements. These different ways of contrast variation in small-angle scattering are extensively used in multidisciplinary research of soft matter, nanomaterials and biological systems. This talk will provide the usefulness of contrast variation in small-angle scattering with some of our recent results on multi-components soft matter.