

## CCNY-1 Facilities Equipment Resources available for PIRE

### 1. CCNY Core Scientific Facilities

- Zeiss Supra 55 SEM with EDS
- JEOL 2100 TEM
- Bruker X'Pert Pro X-ray diffractometer
- Bruker 300 MHz NMR spectrometer (solution-state)
- Bruker 500 MHz NMR spectrometer (solution-state)

### 2. Analytical Instrument Laboratory

This laboratory is located in Steinman Hall at City College of New York, and is equipped with the following analytical instruments for determining the properties of complex fluids at room and high temperatures.

#### *Instrumentation for Rheological and Thermophysical Property Measurement*

- TA Instruments – AR200ex Rheometer: This is a controlled stress, direct strain and controlled rate rheometer. The instrument has the capability of studying dispersions/emulsions under high pressures up to 140bar. With the Peltier plate set-up the operating temperatures can be controlled between -40oC and 200oC. An additional feature of the rheometer is the Small Angle Light Scattering (SALS) accessory which allows for the collection of online particle size distribution under different shearing conditions. The rheometer offers a wide torque range [0.0001 to 200mN.m], ultra high resolution [0.04micro rad], high angular velocity [300rad/s] and high stability normal force transducer [0.01 to 50N].
- TA Instruments – Q200 Modulated Differential Scanning Calorimeter with Mass Flow Control: A research grade MDSC with better than 0.2 microwatt sensitivity. The operating temperature range is cooling system dependent with a maximum 725oC to -180oC.
- TA Instruments – DSC-TGA Q600 SDT: Provides a true simultaneous measurement of heat flow and weight change on the same sample from ambient to 1,500oC. The DSC noise is less than 4 microwatts and the TGA balance sensitivity is 0.1 microgram. The Q600 features automated furnace movement and a horizontal purge gas system with digital mass flow controllers and programmable gas switching capability. A separate Inconel 600 tube permits introduction of reactive gases into the sample chamber.
- Dispersion Technologies – DT 1201: An acoustic, electroacoustic technique for simultaneous measurement of zeta potential and particle size distribution. Unlike most zeta potential and particle size measurement techniques this instrument does not require any sample dilution and can measure both parameters up to 50 volume %. The instrument can readily measure colloids with a viscosity up to 20,000cP and fluids with a micro viscosity up to 100cP. With a large measurement frequency range between 1-100MHz accurate particle size distributions can be obtained between 5nm and 1mm.
- LUM – LUMiSizer 611: A stability analyser which utilises light transmission to track the sedimentation or creaming interface. The instrument can accurately and efficiently measure the stability of an emulsion/dispersion, the particle size distribution as well as the coagulation, flocculation, coalescence and floc strength mechanics. The instrument offers the capability of measuring 12 samples in parallel over a range of applied forces (300 – 3000 rpm) and temperatures (4 – 60°C).
- Pendant bubble: Measurement of both the steady state and dynamic interfacial surface tension.

- Quartz Crystal Microbalance (KSV) for monitoring adsorption on solid surfaces either in quiescent or flowing systems. Dissipation measurement also enables following up the mechanical properties of the adsorbed layer.
- Interfacial shear rheometer (non-commercial apparatus developed at University of Leuven) to measure mechanical response of fluid/fluid interfaces loaded with surfactants or particles.
- Ancillary equipment: IKA Homogeniser for emulsion preparation. pH, temperature and conductivity meter.