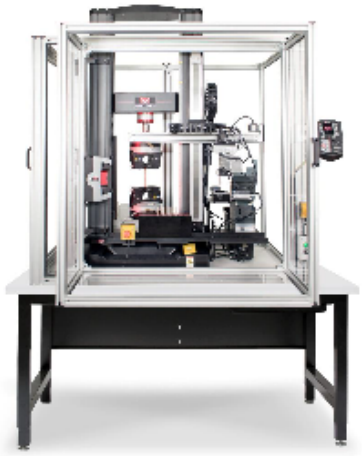
Mechanical and Chemical Res-SH

Quasi static mechanical tests

***Owner:** Xiaojie Zhou*

Principle :	**The test specimen is extended along its major longitudinal axis at a constant speed until the specimen fractures or until the stress (load) or the strain (elongation) reaches some predetermined value. During this procedure, the load sustained by the specimen and the elongation are measured.**	
Capabilities:	**Tensile tests (ISO 527 and ASTM D-638)** **Flexural tests(ISO 178 and ASTM D790)**	
Asset:		**Instron 5567** **30 kN testing machine.** **Environmental chamber could be applied for high-low temperature (-70-350°C) tensile (not available for flexural) tests.**
		**Instron AT3** **30kN Load Cell** **Variable Pressure Hydraulic Control Unit** **Axial Extensometer** **Equipped with automation system(80 bars)**

Impact tests

***Owner:** Mengjun Guo*

Principle :	**The pendulum is raised to a measured point, and it is then released. The weighted end of the pendulum gains speed as it swings toward a mounted molded bar of the test plastic. It strikes the bar, breaks it, and the pendulum loses energy while breaking the plastic bar. Therefore it does not swing as high. The energy lost by the pendulum is equated with the energy absorbed by the test specimen during the breaking process.**

Capabilities:	**Charpy, Unnotched and notched specimens. ISO 179 and ASTM D6110** **Izod, Unnotched and notched specimens. ISO 180 and ASTM D256**	
Asset:		**Ceast resil impactor** **Pendulum impact tests.** **It is equipped with hammers Charpy 4J and Izod 1J, 2.75J, 11J and 44J.**
		**Zwick HIT25P** **Nominal potential energy 25 J** **Charpy pendulum - Energy = 0.5J,2J,4 J - ISO 179** **Charpy pendulum - Energy = 5.4 J - ASTM D6110** **Izod pendulum - Energy = 1 J,2,75 J,11 J - ASTM D256 and ISO 180**
		**Tinius Olsen 899** **Remaining Width (mm)** **ISO8.0±0.2** **ASTM10.16±0.05**

Environmental Stress Cracking resistance

Owner: ***Tingting Zhang***

Principle:	**Immersion of test specimens in fluids under controlled stress or strain.** **The simultaneous action of the chemical and of the stress on the specimen can lead to stress cracking phenomena, hardly predictable by the simple immersion without stress.**
Capabilities:	**Test at constant tensile load according to ISO 22088-2** **Bent strip method according to ISO 22088-3** **U-bending method based on ASTM D1693**

Asset:		**ESCR(Move to ADL)** **Bending bars with different curvature radii** **Test at constant strain, even at high temperature**
		**Memmert HCP 50** **Humidity Control: 20 – 95 % rh** **Temperature range: +18 to +90 °C**
		**Accelerated weathering tester-QUV/SE** **Simulate outdoor accelerated aging conditions of materials, including UV radiation intensity, temperature and humidity effects, etc.**

Heat Deflection Temperature (HDT) tests

Owner: ***Xiaojie Zhou***

Principle :	**The tests most commonly used by the plastics industry to measure short-term thermal capability are ASTM D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load and ISO 75, Plastics –Determination of Temperature of Deflection Under Load. These tests are commonly referred to as Heat Distortion Temperature (HDT) or Deflection Temperature under Load (DTUL).** **Both tests are similar in that the test specimen is supported at two points while a load is applied to the center. The temperature is increased at a constant rate until the specimen deflects a specified amount as indicated by a dial micrometer.** **HDT can only be used as a general indicator of short-term thermal capability. It is useful for comparing similar materials but can be misleading if, for example, an amorphous material is compared to a semi-crystalline material. It doesn't provide any information about long term thermal stability.** **The actual loads and performance requirements will dictate the suitability of the material. Many semi-crystalline resins can be used in applications that experience temperatures higher than their deflection temperature value.**	
Capabilities:	**HDT** **VICAT**	
Asset:		**Instron HV6M HDT VICAT Testers** **ASTM D648/ ISO 75-2** **The most common and critical error is to compare the results from testing performed at 1.8 Mpa (264 psi) with results obtained from testing at 0.45 Mpa (66 psi).**

Drop Weight Impact Tester

Owner: ***Mengjun Guo***

Principle :	**The drop weight impact tester mainly applies instantaneous impact force to test samples such as plastics, organic glass, building materials, ceramics, and paints to test the damage degree and impact energy of the materials.**
Capabilities:	**Drop Weight: 200g;400g**

Asset:		**ELB-LQ-15A** **ISO/DIS125421** **12543-6:1997**

Rockwell Hardness Tester

Owner: ***Tingting Zhang***

Principle :	**The rockwell hardness tester measures the hardness of materials by determining the depth of penetration of an indenter under a large load compared to the penetration made by a preload. The process involves the following steps:** 1. **A preliminary test force (preload) is applied to the material using a diamond or ball indenter to create a small indentation. This helps to break through any surface finish and establish a zero reference position.** 2. **An additional load (major load) is then applied to the indenter, causing it to penetrate further into the material.** 3. **After holding the major load for a specified dwell time, the major load is removed, leaving only the preliminary test force.** 4. **The depth of the indentation left by the major load is measured. The Rockwell hardness number (HR) is calculated based on the difference in depth between the preload and the major load.**

Capabilities:	**Rockwell A Scale (HRA):** **Indenter: Diamond cone** **Major Load: 60 kgf** **Application: Used for testing hard materials such as cemented carbides and thin steel.** **Rockwell B Scale (HRB):** **Indenter: 1/16-inch diameter steel ball** **Major Load: 100 kgf** **Application: Used for testing softer materials such as copper alloys, aluminum, and softer steels.** **Rockwell C Scale (HRC):** **Indenter: Diamond cone** **Major Load: 150 kgf** **Application: Used for testing harder materials such as hardened steel,hard cast irons, and other hard alloys.** **Rockwell D Scale (HRD):** **Indenter: Diamond cone** **Major Load: 100 kgf** **Application: Used for testing materials harder than those tested on the B scale but softer than those tested on the C scale.** **Rockwell F Scale (HRF):** **Indenter: 1/16-inch diameter steel ball** **Major Load: 60 kgf** **Application: Used for testing softer materials similar to those tested on the B scale but with a lower load.** **Rockwell G Scale (HRG):** **Indenter: 1/16-inch diameter steel ball** **Major Load: 150 kgf** **Application: Used for testing materials similar to those tested on the B scale but with a higher load.**

Asset:		**GYJ-HR150A** **D785-23** **HRA; HRB; HRC; HRD; HRF; HRG**