

St. Chavara Centre for Advanced Research in Materials Science



Research Areas Focused

- **Nanomaterials:** Development of nanomaterials for use in electronics, photonics, medicine, and environmental applications.
- **Biomaterials:** Research on materials compatible with biological systems for applications in medical devices, drug delivery, and tissue engineering.
- **Composite Materials:** Development of high-strength, lightweight composite materials, often for use in aerospace, automotive, and structural applications.
- **Smart and Functional Materials:** Design of materials with adaptive properties, like shape memory alloys, piezoelectric materials, and materials for sensors and actuators.
- **Energy Materials:** Research on materials for energy storage (batteries, supercapacitors) and energy harvesting (solar cells, thermoelectrics).
- **Sustainable and Green Materials:** Focus on materials that are sustainable, biodegradable, or recyclable, with applications in packaging, construction, and consumer products.

Techniques and Facilities

Equipment	Make	Brief description / application
Analytical Weighing Balance	Mettler Toledo	High-precision weighing of chemicals, samples and precursors required for accurate solution preparation and materials synthesis. Analytical balances are commonly used for sample and standard preparation.
Analytical Weighing Balance	Saffron	Precision weighing of small quantities of chemicals and materials for synthesis and experimental studies. Saffron analytical balances are designed for accurate laboratory measurements.
Double Distillation Unit	Borosil	Produces high-purity distilled water for solution preparation, chemical synthesis and laboratory experiments where water purity is important.
Hot Plate Magnetic Stirrer	Neuation	Provides controlled heating and magnetic stirring for preparing homogeneous solutions, precursor mixtures and reaction media. Magnetic hot-plate stirrers are widely used for controlled solution preparation.
Probe Sonicator	Labman PRO656	Uses high-intensity ultrasonic energy for dispersion, homogenization and preparation of nanoparticles, colloids and composite materials.
UV Chamber	Coslab	Provides controlled ultraviolet exposure for photo-assisted material studies, UV treatment and investigation of UV-induced changes in materials.
pH Meter	Mettler Toledo	Used for accurate measurement and monitoring of the acidity or alkalinity of solutions during chemical synthesis and materials processing.
Hot Air Oven	Delta Power Controls	Provides controlled heating and drying of substrates, glassware, powders and prepared samples prior to further processing or characterization.
High-Temperature Silicon Carbide Furnace	Delta Power Controls	Enables high-temperature heat treatment, calcination, annealing and thermal processing of advanced materials, ceramics and inorganic compounds.
High-Temperature Kanthal Muffle Furnace	Delta Power Controls	Used for controlled high-temperature calcination, annealing and heat treatment of materials while minimizing exposure to combustion products. Muffle furnaces are commonly used for high-temperature materials processing.

Analytical Weighing Balance (Mettler Toledo, Saffron)

The Mettler Toledo analytical balance is a high-precision instrument designed for accurate mass measurement with readability up to 0.1 mg or better. It uses electromagnetic force compensation to provide stable and reliable readings. Equipped with draft shields, auto-calibration, and digital interfaces, it is widely used for solution preparation, material characterization, and quantitative analysis where accuracy is critical.



pH Meter (Mettler Toledo)

The Mettler Toledo pH meter is a precision instrument for measuring the acidity or alkalinity of solutions, with high resolution (± 0.01 pH). Featuring digital calibration, temperature compensation, and robust electrodes, it provides accurate measurements for chemical reactions, material processing, and water quality analysis. It is indispensable for preparing solutions and monitoring reaction conditions.



Double Distillation Unit (Borosil)

The Borosil double distillation unit is designed to produce ultrapure distilled water by performing two consecutive distillations. Made with high-quality borosilicate glass, it eliminates ionic and organic impurities, providing water suitable for analytical chemistry, sample preparation, and sensitive experiments. Its durable glass construction ensures resistance to heat and chemical attack.

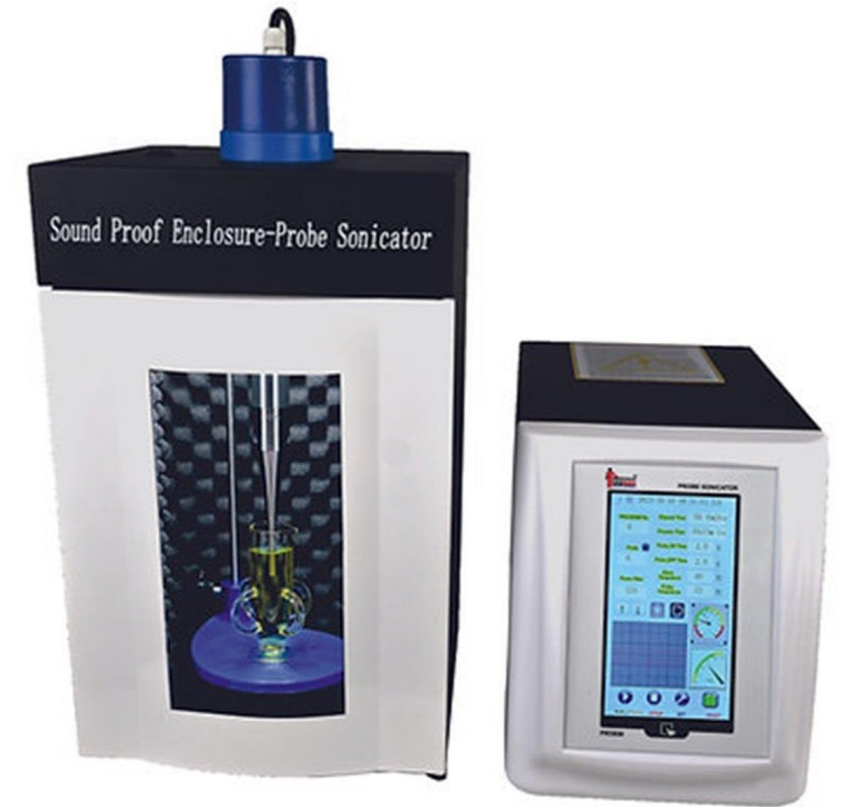


Hot Plate Magnetic Stirrer (Neuation)

The Neuation hot plate magnetic stirrer combines controlled heating with efficient magnetic stirring. With a wide temperature range (up to ~320–550 °C depending on model) and variable stirring speeds, it ensures uniform mixing and heating of solutions. This equipment is essential for dissolving solutes, preparing homogeneous mixtures, and carrying out low-temperature chemical reactions in physics, chemistry, and materials labs.

Probe Sonicator (ELITE, PRO656)

The ELITE PRO656 probe sonicator generates high-frequency ultrasonic waves (~ 20 kHz), producing cavitation in liquids for cell disruption, homogenization, nanoparticle dispersion, and emulsification. It comes with a sound-proof enclosure, touchscreen controls, and adjustable power settings up to 650 W, making it highly effective for preparing nanomaterials, breaking particle agglomerates, and accelerating chemical processes.



UV Chamber (Labman)

The Labman UV chamber is used for sterilization and photochemical applications by exposing samples to ultraviolet light. Commonly employed for microbial decontamination of glassware, thin films, and surfaces, it also supports photocuring and polymerization studies. Its closed chamber ensures user safety while providing uniform UV exposure.

High Temperature Silicon Carbide Furnace (Delta Power Controls)

This furnace uses silicon carbide heating elements to reach very high temperatures (typically up to 1200–1600 °C). It ensures rapid heating, uniform temperature distribution, and stable operation under prolonged use. Applications include sintering ceramics, annealing metals, phase transition studies, and thermal treatments of advanced materials.



Muffle Furnace (Delta Power Controls)

The Delta Power Controls muffle furnace is designed for high-temperature applications (generally up to 1000 °C). It provides a clean, enclosed heating environment ideal for ashing, combustion analysis, heat treatment of materials, and preparation of ceramic or oxide samples. Its insulated chamber ensures energy efficiency and safety.