



Labtech Semi-Automatic Sheet Former Model 300-0. This device assists in the creation of TAPPI standard hand sheets with reduced human interaction, making it ideal for standardizing samples.



Gurley 4340 Automatic Densometer and Smoothness Tester. This device measures the permeability of samples and is used extensively with paper samples.



SV-10 Viscometer. This device is used to measure the viscosity of a variety of fluids. In conjunction with a thermal bath, the viscosity measurements can be taken across a wide range of temperatures.



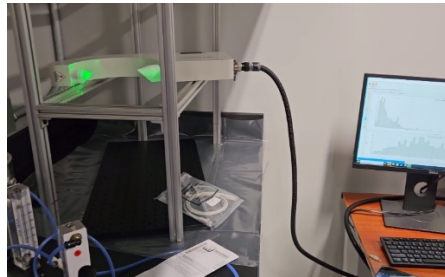
Keysight DSOX1204A Digital Oscilloscope. This device was used to measure the applied voltage to contact ultrasound transducers in atomization experiments.



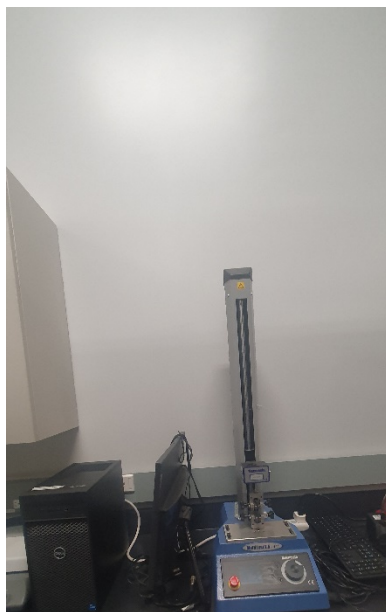
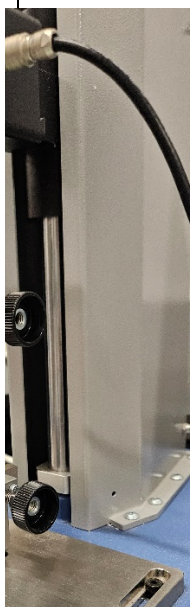
HunterLab ColorFlex EZ. This device is used to characterize the color of samples before and after the drying process to maintain quality standards. The device can easily take multiple measurements and provide average  $L^*$ ,  $a^*$ , and  $b^*$  in the CIELAB colorspace.



Anycubic Photon Mono M5s (3D printer) and Anycubic Wash & Cure Max (bath). The 3D printer is used to create resin structures for laboratory use.



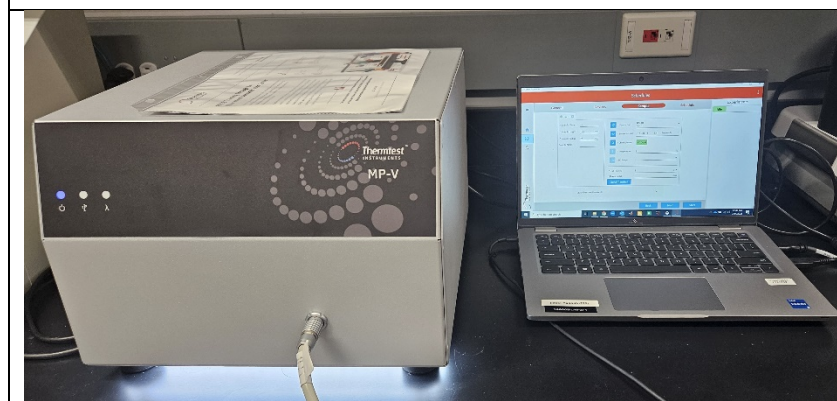
Artium PDI-TK2. This droplet spray analyzer utilizes laser technology and the doppler effect to measure velocity and droplet size, providing detailed droplet and spray analysis.



Mecmesin 2.5-dV. This tensile tester can apply tension and compression forces from as low as 2N up to 2.5kN to measure mechanical properties.



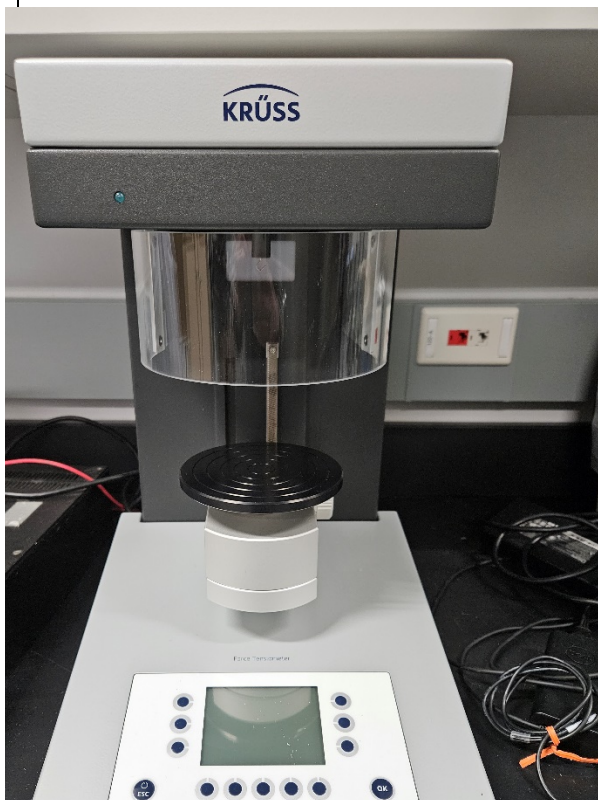
Computrac MAX 4000XL. This moisture analyzer is used to determine moisture content and dry weight of samples. Moisture content of samples is a key factor in the drying process and understanding the amount of moisture in a sample is critical to optimizing the drying process.



Thermtest MP-V. This device uses transient plane source (TPS) and transient hot wire (THW) methods to measure the thermal conductivity, thermal diffusivity, thermal effusivity, and volumetric heat capacity of solids, liquids, pastes, and powders.



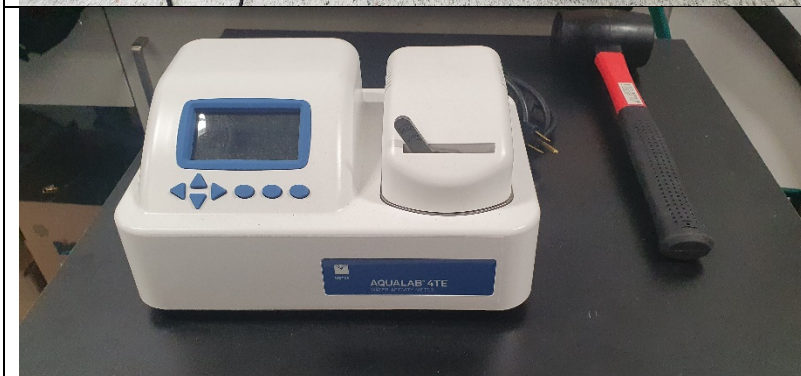
Labtech Automatic Sheet Press Model 400-1. This press is used to remove moisture from the sample as part of the TAPPI standard procedure for creating a paper hand sheet. The press can be used at a variety of different pressures and with different pressing durations.



Krüss K20 Surface Tensiometer. The Tensiometer measures the surface tension of liquids using a force method. The tensiometer can measure surface tension at specific temperatures in conjunction with a thermal bath.



ThermoFisher Scientific Oven. This oven is used for small-scale heating and drying tests that don't require the smart dryer.



AQUALAB 4TE. This device measures water activity of samples to within 0.03. Especially helpful for food samples, water activity can be a good predictor of shelf-life.



Smart Dryer



Airbone Ultrasound  
Transducer mounted at  
the entrance of the Smart  
Dryer



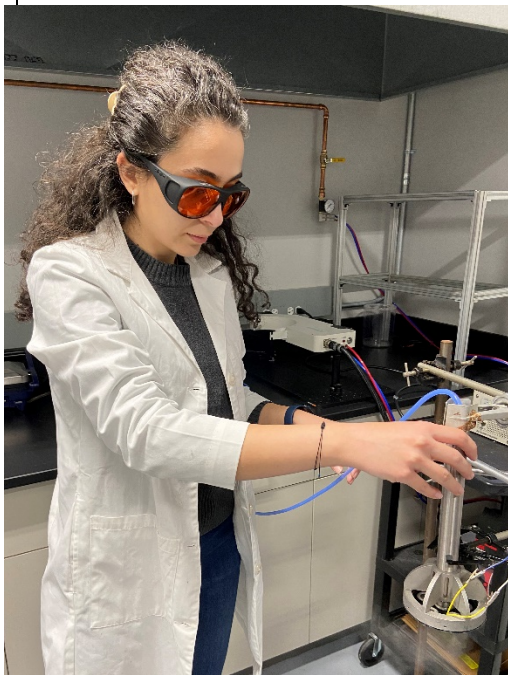
IR emitter inside the  
Smart Dryer

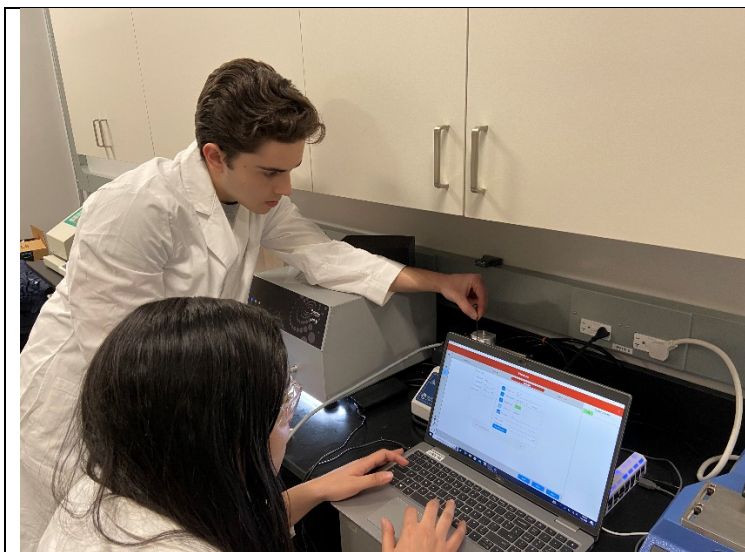


Slot Jet Reattachment  
(SJR) nozzles



CARD students are constantly working on research focused on paper and pulp, chemicals, and food industry needs related to decarbonization and electrification of their industrial processes.





CARD students analyze the thermal, mechanical, and various other properties of their samples to assess the impact of novel technologies on the quality of the final product.