

NEWCASTLE ANFF HUB EQUIPMENT AVAILABLE FOR HIRE

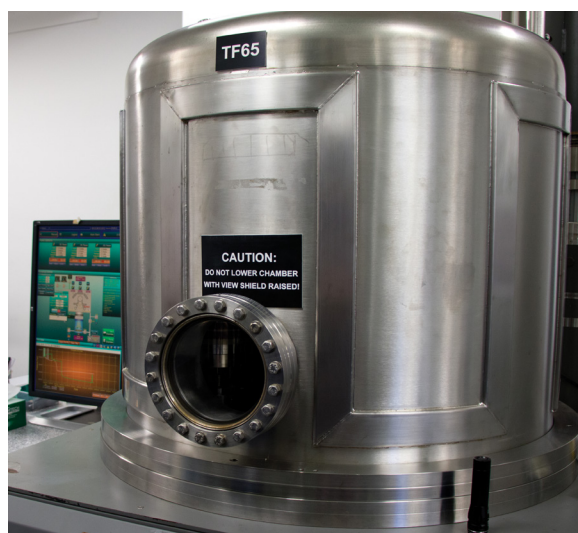
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FUNCTIONAL PRINTING / R2R PRINTING FACILITY



COATING LINE

The Solar 1 coating line from GM is a reel-to-reel (R2R) coating system which can take a range of webs (substrates) and deposit inks using various coating techniques such as Gravure, Flexographic, rotary screen-printing and slot-die coating. The Solar 1 line is designed for 300 mm wide web and has two 1m ovens for drying. This versatile system allows for a range of conductive and non-conductive inks to be deposited.



SPUTTER COATER

The R2R sputter coater is a 3-target system that can coat rolls up to 100 m in length (300 mm wide) in various metals including aluminium, silver, and titanium. These depositions can also be patterned when required for electrodes and separate devices.



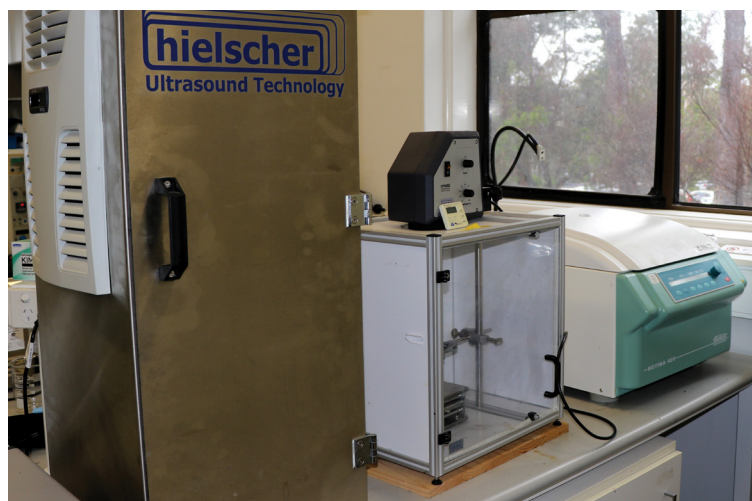
LAMINATOR

The R2R laminator is used to encapsulate materials in barrier film plastics. It utilises a flexographic station to deposit UV curable glues which are then cured in-line using a 5kW UV lamp. This system can also be used to apply other layers such as conductive tapes and separating films.

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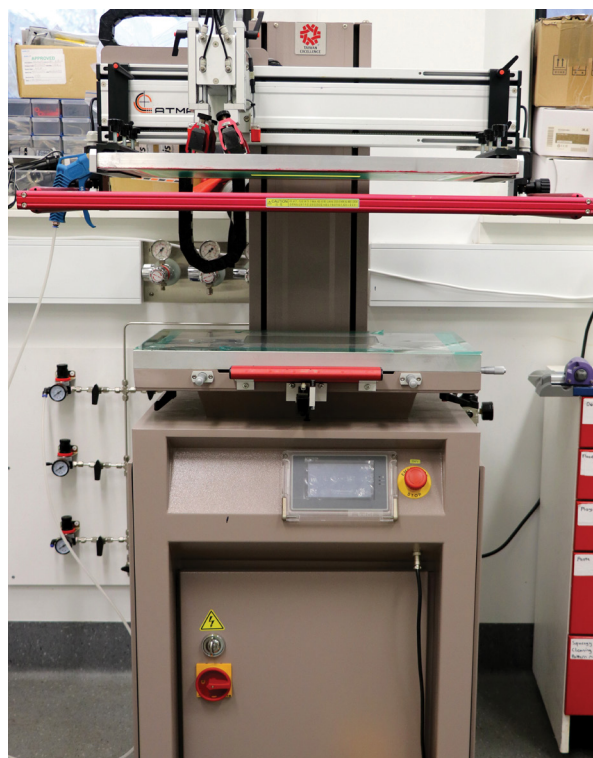
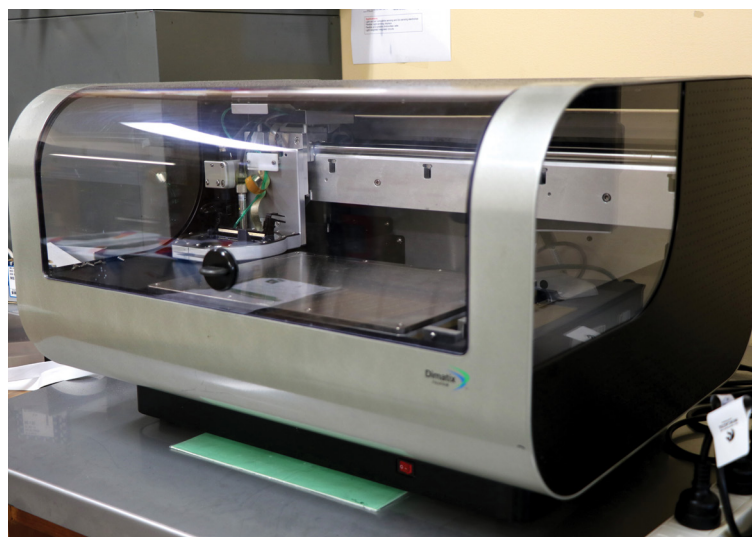


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INK PREPARATION

All of the processes in the print facility begin with the ink formulation. The Newcastle ANFF Hub has facilities to synthesise and prepare many polymer based inks and polymer nanoparticle inks.



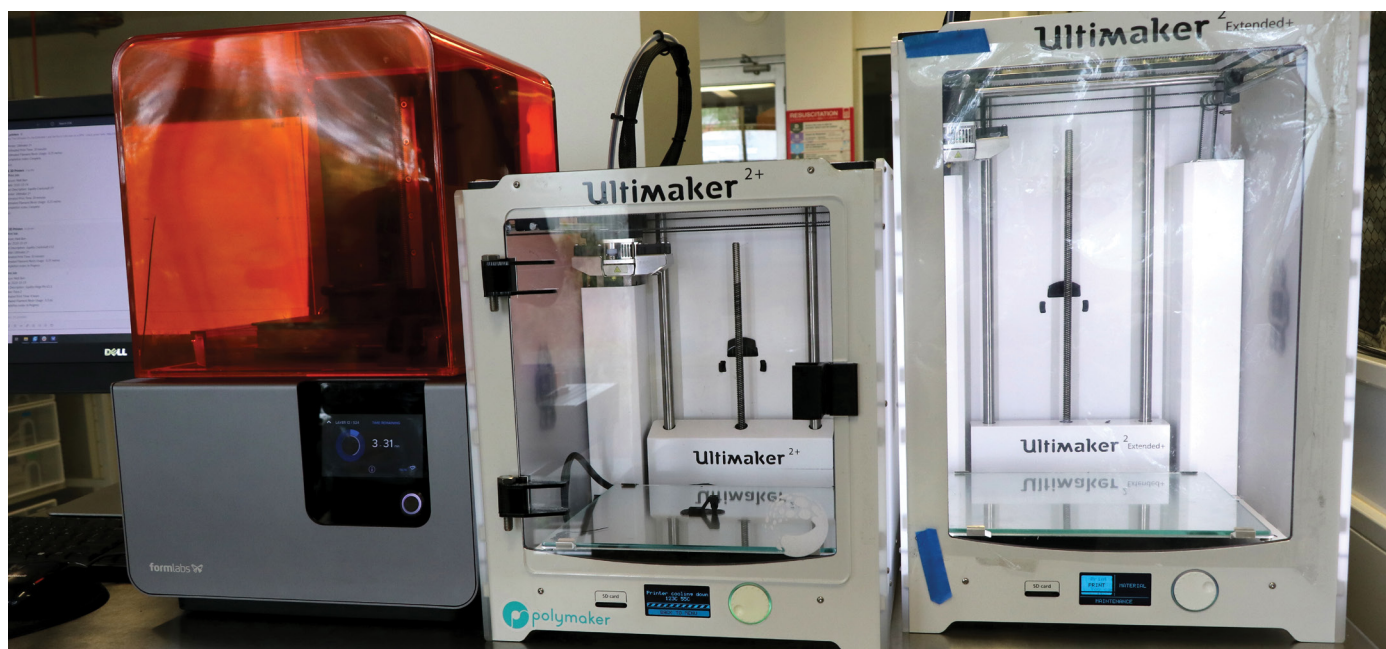
BENCH COATERS

Batch scale testing of printing processes is carried out using the bench coating systems available in the Hub including flatbed screen printing and single stripe slot-die coating. A Fujifilm Dimatix Materials printer is also available allowing for precise 2D patterning of functional inks for sensors and other electronic devices.

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RAPID PROTOTYPING



3D PRINTING SUITE

A raft of Ultimaker FDM and Formlabs Resin printers are available in the Hub to rapidly iterate over part designs and support the broader work of the facility. This includes a Form 3B resin printer which is focussed on biocompatible resins for work with medical and biological projects.



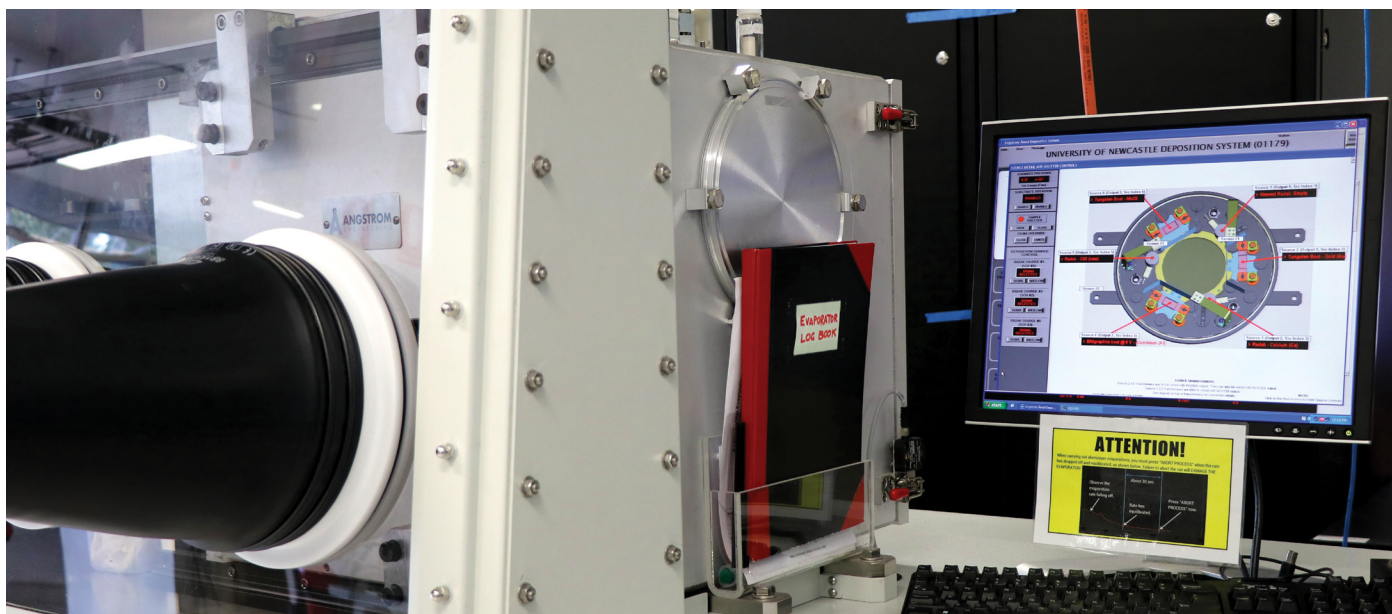
WET LAB

Most projects in the Hub begin in the complete wet-lab facility which is available for prototyping of lab-scale devices. Multiple fume hoods, spincoaters, hotplates and chemical storage allow for complex thin-film devices to be made.

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RAPID PROTOTYPING



THERMAL EVAPORATION

The thermal evaporator deposits thin layers of metals and oxides on substrates up to 250 mm in diameter. Complex multi-material depositions are also possible and layers can be only a few nanometres thick. This tool is located inside an inert atmosphere (nitrogen) glovebox, allowing for environmentally sensitive samples to be dealt with.



CLEAN ROOM

An ISO 7 anti-chambered clean space with HEPA filtered positive pressure airflow, this room enables clean operations critical for many surface sensitive projects.

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RAPID PROTOTYPING

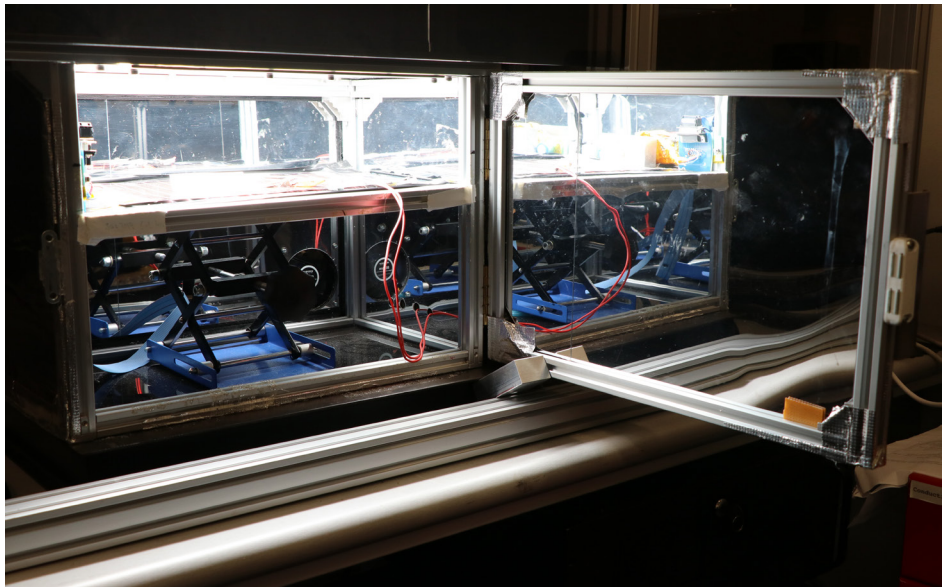


GLOVEBOXES

There are 3 inert atmosphere (nitrogen) gloveboxes in the Newcastle ANFF Hub, each having unique capabilities. The fabrication glovebox is setup for spincoating in clean and inert conditions. The testing glovebox houses the solar testing equipment for working with environmentally sensitive devices. The evaporator glovebox houses the thermal evaporator and is also connected to the XPS/UPS surface analysis system, enabling sensitive samples to be transferred without interacting with the environment.

TESTING TOOLS

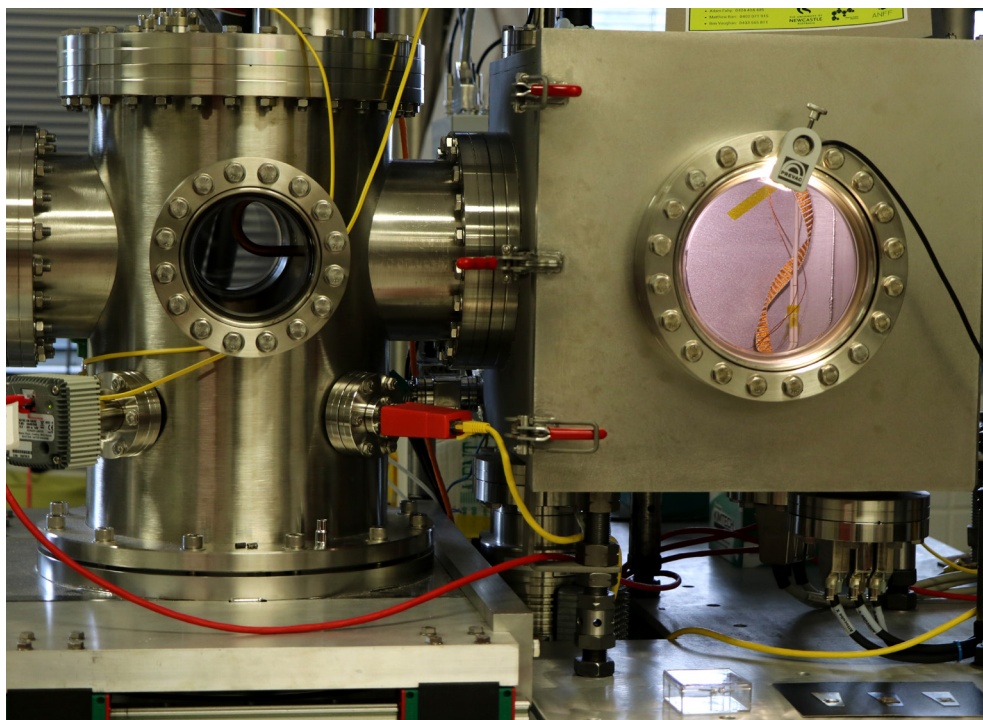
The Newcastle ANFF Hub has a suite of testing tools for working with thin-film devices such as sensors and printed solar cells. External quantum efficiency (EQE) measurements can be obtained along with AM1.5 measurements, both essential for characterising solar cell performance. A dedicated probe station is available for measurement and testing of sensors.



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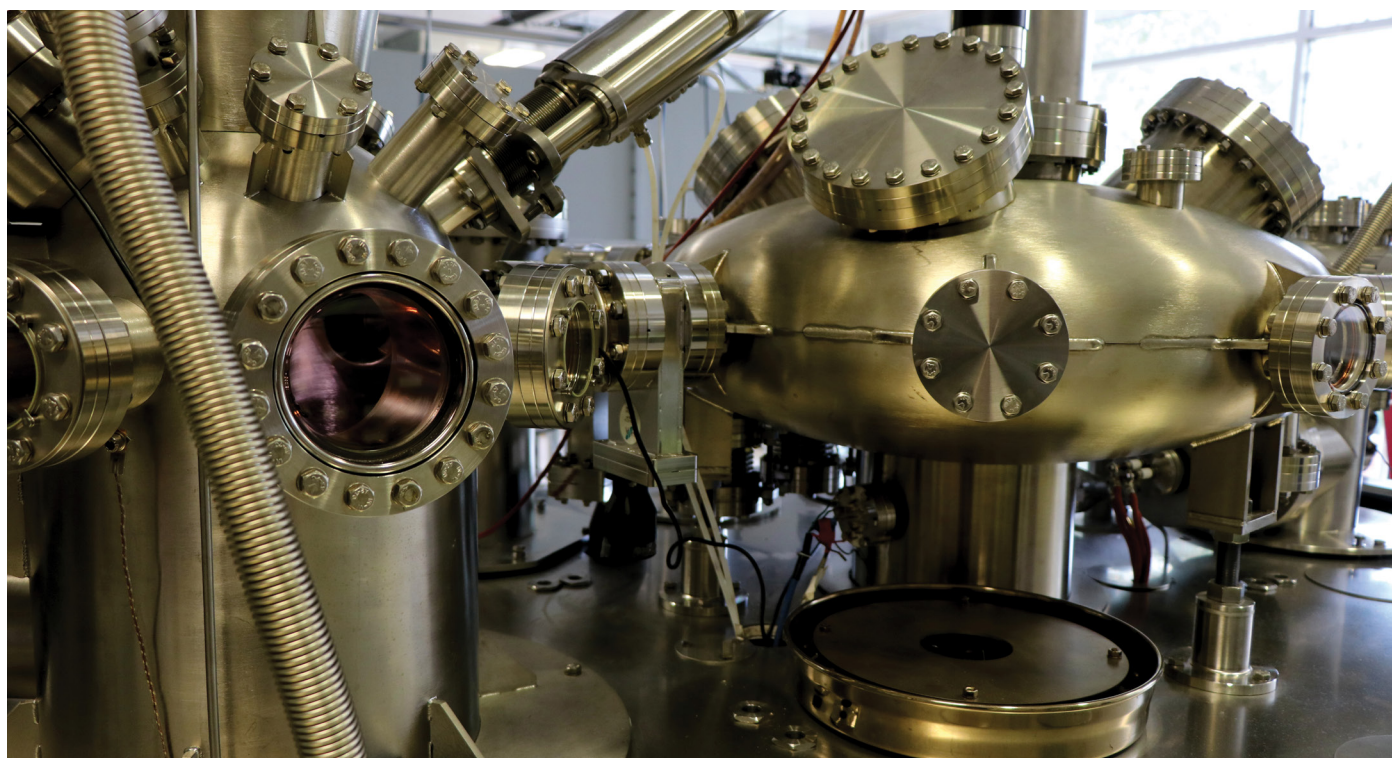


SURFACE CHARACTERISATION



SHeM

Scanning helium microscopy (SHeM) is a new imaging technique which is able to investigate delicate structures completely non-destructively by taking advantage of a neutral helium beam as a chemically, electrically, and magnetically inert probe of the sample surface. This new technique is suited to biological samples or other delicate materials such as soft polymers and explosives.



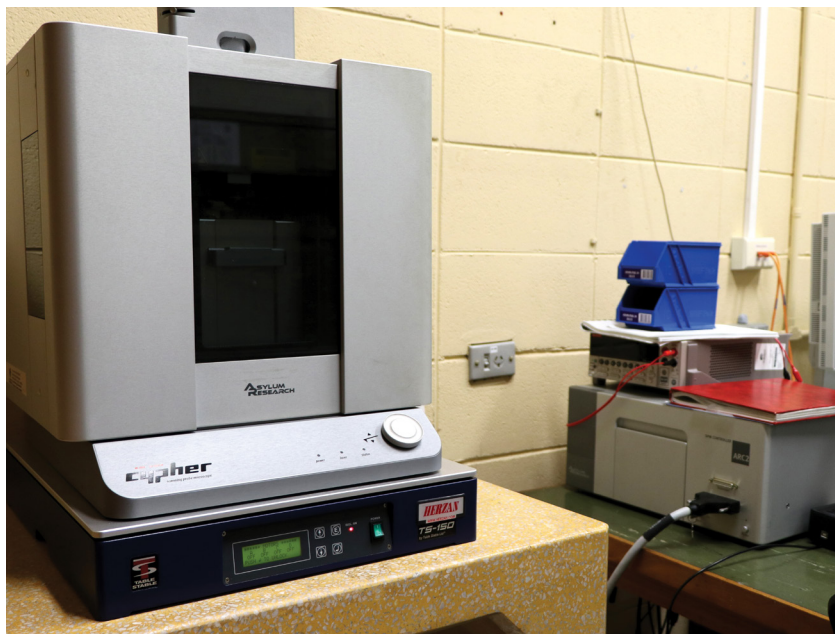
XPS/UPS

The X-ray and Ultra-violet photoelectron spectroscopy (XPS/UPS) surface analysis system at the Newcastle Hub is the only system of its type in Australia that is connected to an inert atmosphere glovebox. This allows highly sensitive samples to be fabricated and then characterised without environmental interruption. The system also has a preparation chamber where various evaporation and sputtering steps can be carried out on samples prior to analysis.

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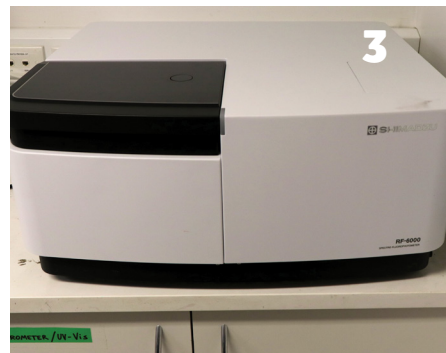


SURFACE CHARACTERISATION



AFM

The Cypher ES atomic force microscope is a high resolution, fast and stable AFM that also has full environmental control. Gas and liquid environments are possible along with standard in-air AFM measurements.



1. PROFILOMETRY

The Dektak XT-S stylus profilometer provides the ability to quickly look at surface topography on samples produced using spincoating in the Newcastle ANFF Hub wet-lab. This highly repeatable, stable instrument can be used on various samples for thickness measurements as well as uniformity.

2. UV-VIS/ 3. FLUORIMETRY

The Agilent Cary 6000i UV-Vis spectrometer and the Shimadzu RF-6000 Spectrofluorophotometer are a powerful team for characterising the optical and fluorescence properties of thin-film samples and inks. Various accessories including integrating spheres are available for both tools.