



# UNIVERSITY of STRATHCLYDE CMAC NATIONAL FACILITY

**A world class pharmaceutical and fine-chemicals manufacturing research facility, inspiring researchers, informing innovation**

## World-Class Expertise

- Crystallisation
- Process Development
- Materials Characterisation
- Formulation
- Process and Product Analysis

## World-Class Capabilities

### Primary Processing

Crystallisation platforms covering batch and continuous methods e.g. cooling, anti-solvent, reactive and evaporative crystallisation

### Secondary Processing

Formulation platforms investigating solid oral dosage forms e.g. extrusion, blending, compaction and milling

### PAT / Spectroscopy

Process monitoring technologies and off-line benchtop spectroscopy techniques e.g. FBRM, PVM, Raman, IR, UV-Vis

### X-Ray Diffraction

Powder, single crystal, and small angle X-ray scattering for understanding molecular structure

### Imaging

Visualisation using a variety of microscopes e.g. optical, SEM, AFM and nanoscale computed tomography

### Materials Characterisation

Techniques to understand the physical properties of solid powders and tablets e.g. BET, porosity, pycnometry, surface energy, vapour sorption, density, dissolution, solubility



We are based in the new Technology and Innovation Centre at University of Strathclyde, Glasgow, UK.

The £100m state of the art facility has been equipped using £16m funding awarded by HEFCE UKRPIF, the Wolfson Foundation and University of Strathclyde. This is supported with £22.8m Industry and charity contributions.

**Find out how we can help you**

Contact: [national-facility@cmac.ac.uk](mailto:national-facility@cmac.ac.uk)  
Web url: [www.cmac.ac.uk/facilities.htm](http://www.cmac.ac.uk/facilities.htm)  
Twitter: [@EPSRC\\_CMAC](https://twitter.com/EPSRC_CMAC)

## Primary Processing

### Nucleation Platforms:

Valve Mixer, Modular MicroReaction System (MMRS), Ehrfeld/BTS  
Impinging Jet Mixer, MicroInnova

### Discovery Platforms:

OptiMax Synthesis Workstation (1 x 1 L), Mettler Toledo

EasyMax Synthesis Workstation

(2 x 100 mL), Mettler Toledo

Crystalline (8 mL scale), Technobis

Crystal 16 (2 mL scale), Technobis

Zebra Fish & Polar Bear, Cambridge Reactor Design

NanoAssemblr, microfluidics manufacturing platform, Precision Nanosystems

Mitos Dropix, Advanced Droplet System, Dolomite

Crystallisation Discovery Platform,

Crissy XXL, Zinsser

### Continuous Crystallisation Platforms:

Skid mounted modular continuous

crystallisation platforms, MicroInnova

DN10, Continuous Crystalliser, Soham

Glassware & Cambridge Reactor Design

DN15, Continuous Crystalliser, NiTech

& Alconbury Weston Ltd.

Rattlesnake, Continuous Crystalliser,

Cambridge Reactor Design

Stirred Tank Reactors, Radleys

Agitated Cell Reactor, CoFlore,

AM Technology

Taylor Couette, Scott Glass

### Filtration:

Rotary Drum, Continuous filtration,

Cordell Group

Nutsche Filters, Powder Systems

Falcon Filtration Robot, Cambridge

Reactor Design

### Ancillaries:

Rotor-Stator, IKA, Magic Lab, Flow Cells,

Heater/Chillers, Incubators, Pumps various,

Mass Flow Meters & Controllers,

Ultrasonic Baths, Stirrer/Hot Plates.

## PAT / Spectroscopy

FBRM (Focused Beam Reflectance Measurement), Particle Track G400, Mettler Toledo

Particle Sizing, InnoPharma, Eyecon

PVM (Particle Vision Measurement),

PVM V819, Mettler Toledo

In-Situ Particle Viewer (ISPV), Perdix

FT-IR, Matrix MF, Bruker

ATR-FT-IR, ReactIR 15, Mettler Toledo

FT-IR, MB3000, ABB

Raman, RXN2 Hybrid, Kaiser

Raman, RXN1, Kaiser

UV-Vis, NMC 105, NCS, 651, MC 5651, Zeiss

Turbidity, CrystalEYES, HEL Group

FT-NIR, Matrix F, Bruker

Terahertz Raman, Ondax

pH probes, Mettler Toledo

Conductivity probes, Mettler Toledo

## Imaging

Optical Microscopy, Leica

SEM, FE-SEM 8500, Keysight Technologies

AFM, Dimension FastScan, Bruker

AFM, MultiMode 8, Bruker

IR Microscope, Hyperion 3000, Bruker

Raman Microscope, XPlora Plus, Horiba

Thermal Imaging Camera, A6702sc InSb, FLIR

Microscope Stages: Temperature, Rheology,

Freeze Drying, Linkam

High Speed Imaging, FastCam, Photron

TOF-SIMS, ION-TOF

X-Ray Nano Computed Tomography,

SkyScan 2211 Bruker

## Secondary Processing

Bin Blender, MBo15AB (Agiblend)

Laboratory Blender, Pharmatech

High Shear Wet Granulator, TMG 1/6,

Vertical Granulator, Glatt

Fluid Bed Dryer, Strea-1 Pro Laboratory Fluid

Bed Unit, GEA

Conical/Hammer Mill, Fitz Mill L1A,

Fitzpatrick Company

Tablet Press, XP1 Research Tablet Press,

Korsch

Dry Granulation, BT120 Bench Top Roller

Compactor, Alexanderwerk

11mm Hot Melt Extruder/Twin Screw

Extruder, Pharma 11, Thermo Electron

16mm Hot Melt Extruder/Twin Screw

Extruder, Eurolab Pharma 40:1, 1000rpm,

Thermo Electron

Mini Injection Molder, Haake MiniJet Pro,

Thermo Electron

Cube Mixer KB, Erweka

Spray Dryer, B-290, Buchi

Encapsulator, B-395 Pro, Buchi

Aerosol Inkjet 3D Printer, AJ200, Optomec

Plastic 3D Printer, Leapfrog

Ancillaries: Tableting Tools, Disintegration

Tester, Friability Tester, Sample Divider,

Sieves (100mm & 400mm), Filters, Rotary

Evaporator

## X-Ray Diffraction

Single Crystal XRD, Kappa Apex II,

Mo radiation, Bruker

Single Crystal XRD, D8 Venture, Cu radiation,

Bruker

Powder XRD, D8 Discover, Cu radiation,

humidity stage, Bruker

Powder XRD, D8 Advance, Cu radiation,

1 x plate & 2 x capillary, Bruker

XRD Pair Distribution Function (PDF)

Analysis, Empyrean, Cu, Ag & Mo radiation,

PANalytical

*All above XRD's equipped with cryostream attachment*

Benchtop Powder XRD, D2 Phaser, Cu

radiation, Bruker

## Materials Characterisation

### Dissolution Testing:

pH Solubility Studies, inForm, Sirius

Surface Dissolution Imager (SDI), Sirius

Dissolution testers, DT726 (USP 1, 2, 5, & 6)

and DFZ720 (USP 4), Erweka

### Thermal Analysis:

Simultaneous Thermal Analysis (DSC/TGA),

STA449 F1 Jupiter, Netzsch

Modulated DSC, DSC 214 Polyma, Netzsch

### Chromatography:

HPLC-MS, 1290 with Q-TOF, Agilent

GC-MS, 5977A with headspace sampling,

Agilent

### Physical Property Measurements:

Surface Area Measurement (BET Analysis),

Autosorb-iQ-MP-2ST, Quantachrome

Mercury Porosimeter, PoreMaster 60,

Quantachrome

Gas Pycnometer, MicroUltraPycnometer

1202, Quantachrome

Bulk/Tapped Density, AutoTap,

Quantachrome

Surface Energy Analyzer, iGC SEA, Surface

Measurement Systems

Dynamic Vapour Sorption, DVS Advantage 1,

Surface Measurement Systems

Compression Testing (5N & 10N Load Cells),

5942, Instron

Powder Rheometer, FT4, Freeman Technology

Liquid Rotational Rheometer, Haake MARS,

Thermo Fisher

Flowability, Copley, BEP2

Single-Axis Acoustic Levitator with

temperature and humidity incubator

(OKOLab), Materials Development Inc.

Surface Contact Angle Goniometer, KRUSS

Water Activity Measurement, LabMaster AW,

Novasina

Moisture Meter MA, Sartorius

Hybrid Karl Fischer Moisture Titrator, MKH-

700, Kyoto Electronics Manufacturing Co.

Polarimeter, Autopol V, Rudolph Research

Nanoparticle sizer, IZON, Q-Nano

Next Generation Impactor (NGI),

USP 601, Copley

Quantitative Circular Dichroism, Applied

Photophysics

### Benchtop Spectrometry:

FT-NIR, MultiPurpose Analyser (MPA), Bruker

FT-IR with ATR, TENSOR II, Bruker

500 MHz NMR, AVHD500, Bruker (*located in*

*Department of Pure and Applied Chemistry*)

### Particle Sizing & Shape Analysis:

Laser Diffraction Particle Sizing, Mastersizer

3000 with HydroSight, Malvern

Particle Size & Shape Analysis, Morphologi

G3, Malvern

Particle Size & Shape Analysis, QicPic/Ro6,

Sympatec

Dynamic Light Scattering, ZetaSizer Nano ZS,

Malvern

Nanoparticle Characterisation, NanoSight,

Malvern