

Transforming Medicines Development and Manufacture

CMAC – Continuous Manufacturing and Advanced Crystallisation

Research & Consultancy Services

Primary Processing

We provide rapid process development, research and consultation services for crystallisation (batch & continuous) targeting desired particle attributes.

Secondary Processing/Drug Product

Specialisation lies in secondary processing formulation services and consultancy on a variety of solid oral dosage platforms e.g. blending, twin screw granulation, milling, hot melt extrusion, fluid bed and spray drying, and compaction.

Chemical & Physical Characterisation

CMAC manage various techniques to understand the chemical and physical properties of materials including LC, GC, MS, BET, surface energy, vapour sorption and flowability.

Advanced Characterisation Techniques

Our techniques allow investigation of final product performance using X-Ray diffraction, SAXS to examine properties of nanoparticles, surface analysis and API distribution studies of tablets using Nano CT. ToF-SIMS is available to characterise organic inclusions, surface imaging and depth profiling. There are also numerous PAT capabilities.



Working with CMAC

We have experience in leading and supporting projects across academia and industry.

We apply our research expertise to support industry during both early product development phases to fully commercialised product manufacturing.

CMAC Offers:

- Dedicated support within a World Class Manufacturing Research Facility
- Unique expertise in advanced crystallisation, process development, formulation and process analysis
- Continuous processing MicroFactories for process development, state-of-the-art analysis and characterisation capabilities and a comprehensive suite of PAT tools
- Proven track record in project delivery and expert consultation services



Contact Us

Contact CMAC with your enquiries

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CMAC is based in the Technology and Innovation Centre at the University of Strathclyde, Glasgow, UK. The £100M state of the art facility has been equipped using £11.4M funding awarded by HEFCE UKRPIF, the Wolfson Foundation and University of Strathclyde. This was supported with £22.8M from industrial and charitable bodies and supports the EPSRC Future Manufacturing Research Hub (2017-2023).

Primary Processing

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
Crystallisation Discovery Platform,
Crissy XXL, Zinsser
NanoAssemblr, microfluidics platform, Precision Nanosystems
Rotor-Stator Magic Lab, IKA

Continuous Crystallisation Platforms:

DN15 Continuous Oscillatory Baffled Crystalliser, Nitech
Rattlesnake, Continuous Oscillatory Baffled Crystalliser,
Cambridge Reactor Design
MSMPR Microfactory, CMAC
LCTR-Tera3100-HC, Laminar

PAT / Spectroscopy

FBRM Particle Track G400,
Mettler Toledo
Eyecon, InnoPharma
PVM V819, Mettler Toledo
FT-IR, Matrix MF, Bruker
FT-IR, ReactIR15, Mettler Toledo
FT-IR, MB3000, ABB
Raman, RXN2 Hybrid, Endress & Hauser
Raman, RXN1, Endress & Hauser
UV-Vis, Zeiss
NIR, Matrix F, Bruker
Terahertz Raman, Coherent

Imaging

Optical Microscopy, Leica
SEM, Hitachi
AFM, FastScan, Bruker
IR Microscope, Hyperion 3000, Bruker
Raman Microscope, XPlora Plus with terahertz Raman Module, Horiba, Coherent
Thermal Imaging Camera, FLIR
Microscope Stages: Temperature, Rheology,
Freeze Drying, DSC, Linkam
High Speed Imaging, FastCam, Photron
Optical Coherence Tomography (OCT), Thorlabs

Secondary Processing/Drug Product

Compaction Simulator HB50, Huxley Bertram
Bin Blender, Pharmatech
High Shear Wet Granulator, Glatt
Fluid Bed Dryer, GEA
Conical/Hammer Mill, Fitzpatrick Company
Tablet Press, Korsch
Dry Granulation, Roller Compactor, Alexanderwerk
11mm Hot Melt Extruder/Twin Screw
Extruder, Pharma 11, Thermo
16mm Hot Melt Extruder/Twin Screw
Extruder, Eurolab Pharma 40:1, 1000rpm,
Thermo Electron
Mini Injection Molder, Haake MiniJet Pro,
Thermo Electron
Spray Dryer, B-290, Buchi
Encapsulator, B-395 Pro, Buchi
Aerosol Inkjet 3D Printer, AJ200, Optomec
Raise 3D Pro2 3D Printer, RS components
Supercritical CO₂ Sci-Med
AT50 Tablet Tester, Sotax

Ancillaries: Disintegration, Friability, Hardness testing, Sieves

X-Ray

Single Crystal XRD, Kappa Apex II,
Mo radiation, Bruker
Single Crystal XRD, D8 Venture, Cu radiation,
Bruker
Powder XRD, D8 Discover, Cu radiation,
variable temperature & humidity stage,
capillary, Bruker
Powder XRD, D8 Advance, Cu radiation,
1 x multi-well plate (screening) & 2 x capillary, Bruker
XRD Pair Distribution Function (PDF)
Analysis, Empyrean, Ag & Mo radiation,
PANalytical
Benchtop Powder XRD, D2 Phaser, Cu
radiation, Bruker
SAXS/WAXS Cu/Cr/Mo Xeuss 2.0 5M, Xenocs
Nano Computed Tomography,
SkyScan 2211 Bruker

Characterisation

Dissolution Testing:

inForm, Pion
Surface Dissolution Imager (SDI), Pion
Dissolution (USP 1 and 2), Erweka

Thermal Analysis:

Simultaneous Thermal Analysis (DSC/TGA),
STA449 F1 Jupiter, Netzsch
Modulated DSC, DSC 214 Polyma, Netzsch

Chromatography:

HPLC-MS, 1290, Agilent GC-MS,
5977A with headspace sampling, Agilent

Physical Property Measurements:

Surface Area Measurement (BET Analysis),
Autosorb-iQ-MP-2ST, Anton Paar
Mercury Porosimeter, PoreMaster 60,
Anton Paar
Gas Pycnometer, MicroUltraPycnometer
1202, Anton Paar
Bulk/Tapped Density, AutoTap,
Anton Paar
Surface Energy Analyzer, iGC SEA, Surface
Measurement Systems
Dynamic Vapour Sorption, DVS Advantage 1,
Surface Measurement Systems

Powder Rheometer, FT4, Freeman
Technology Liquid Rotational Rheometer,
Haake MARS, Thermo Fisher
Surface Contact Angle Goniometer, KRUSS
Karl Fischer Moisture Titrator, MKH-
700, Kyoto Electronics Manufacturing Co.
Circular Dichroism, Applied Photophysics
Powder Flow Tester, Brookfield

Benchtop Spectrometry:

FT-NIR, MultiPurpose Analyser (MPA), Bruker
FT-IR with ATR, TENSOR II, Bruker
Terahertz, Teraview

Particle Sizing & Shape Analysis:

Laser diffraction, Mastersizer3000 with HydroSight, Malvern Panalytical
Particle Size & Shape Analysis, Morphologi
G3, Malvern Panalytical
Particle Size & Shape Analysis, QicPic/Ro6,
Sympatec
Dynamic Light Scattering, ZetaSizer Nano ZS, Malvern Panalytical
TOF-SIMS, ION-TOF
SIFT-MS, SYFT