



CMAC
FUTURE MANUFACTURING
RESEARCH HUB

Transforming Medicines Development and Manufacture

CMAC - Continuous Manufacturing and Advanced Crystallisation Research & Consultancy Services

Primary Processing

Experts in Crystallisation, we take flow chemistry output and develop crystallisation and isolation. We can provide rapid process development and consultancy services for crystallisation (batch & continuous) targeting desired particle attributes.

Secondary Processing

CMAC can provide 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.

Advanced Characterisation Services

Materials characterisation techniques to understand the physical properties of materials e.g BET, porosity, surface energy, vapour sorption, density, solubility.



Application of advanced characterisation techniques, examples including investigation of final product performance using SAXS to examine properties of nanoparticles, surface analysis and API distribution studies of tablets





using Nano CT and use of ToF-SIMS to characterise organic inclusions, surface imaging, and depth profiling. A full list of CMAC's analytical and PAT capabilities are listed overleaf.

Working with CMAC

We deliver consultation, training and research services on a global scale. 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 technical support within a World Class Manufacturing Research Facility
-  Unique expertise in advanced crystallisation, process development, formulation, product and process analysis
-  Continuous processing skids 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 CMAC with your enquiries

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 ISPE



FOYA 2016
Facility of the Year Awards
Honorable Mention



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, Cambridge Reactor Design

DN15, Continuous Crystalliser, NiTech & Alconbury Weston Ltd.

Rattlesnake, Continuous Crystalliser,

Cambridge Reactor Design

Stirred Tank Reactors, Radleys

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, combined DSC Imaging, Linkam High Speed Imaging, FastCam, Photron

TOF-SIMS, ION-TOF

X-Ray Nano Computed Tomography,

SkyScan 2211 Bruker

Secondary Processing

Bin Blender, MB015AB (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

Custom Made Supercritical CO₂ rig. Vessel

sizes 200 and 500 cc (fixed bed). 200cc

stirred vessel down to 1cc vessel for small

scale, Sci-Med

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,

variable temperature & humidity stage,

capillary, Bruker

Powder XRD, D8 Advance, Cu radiation,

1 x plate & 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

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/R06,

Sympatec

Dynamic Light Scattering, ZetaSizer Nano

ZS, Malvern