

Brings catalysis over lightspeed

REALCAT

What is REALCAT ?

Unique high-throughput chemistry and biotechnology academic platform:



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Unique high-throughput chemistry and biotechnology academic platform:

Using robotised preparation and testing platforms coupled with fast and broad detectors

To get thousands of tests done in no time

To find the perfect catalyst/sample/conditions set ...



What does REALCAT do ?

High-throughput chemistry and biotechnology experiments:



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Mainly catalysis for biomass valorisation

Chemo catalysis (Heterogenous & Homogenous)

Biocatalysis (Free & Immobilised catalysts)



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Biocatalysis (Free & Immobilised catalysts)

But also, various chemo- and bio- assays for diagnostics, materials, environment, ...



How does REALCAT work ?

A complete and clever combination of fast robots:



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A complete and clever combination of fast robots:

With **versatility**

Each robot have multiple tools, detectors, ...

Each robot completes each others capacities



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Each robot completes each others capacities

With **flexibility**

All robots are independent and will be favourably combined to fit your workflow



How to work together ?

Wide gradation of collaboration conditions and pricing levels:

Offering R&D services in the form of:

- Research collaborations or
- Provisions of services



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With the participation of:

- the Platform staff and/or
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For both:

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With the participation of:

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Various levels of prices and IP sharing :

- 1) Internal
- 2) Academic Collaboration
- 3) Industrial Collaboration
- 4) Services

Who makes REALCAT live ?

A complementary team composed of:

EXPERTS IN HT

Dr. Quentin HAGUET
Dr. Svetlana HEYTE
Dr. Joelle THURIOT-ROUKOS

SUPPORT ENGINEERS

Alfred AMEADAN (MS)
Wahba SAWEIRAS (IT)

LAB TECHNICIAN

Ophélie PARADIS

OPERATIONAL TEAM

GENERAL COORDINATOR

Pr. Sébastien PAUL

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EXPERTS IN BIOMASS VALORISATION

Pr. Franck DUMEIGNIL
Pr. Sébastien PAUL

THEMATIC EXPERTS

EXPERTS IN DATA PROCESSING

Pr. Pierre CHAINAIS
Pr. Sophie DABO

EXPERTS IN BIOCATALYSIS

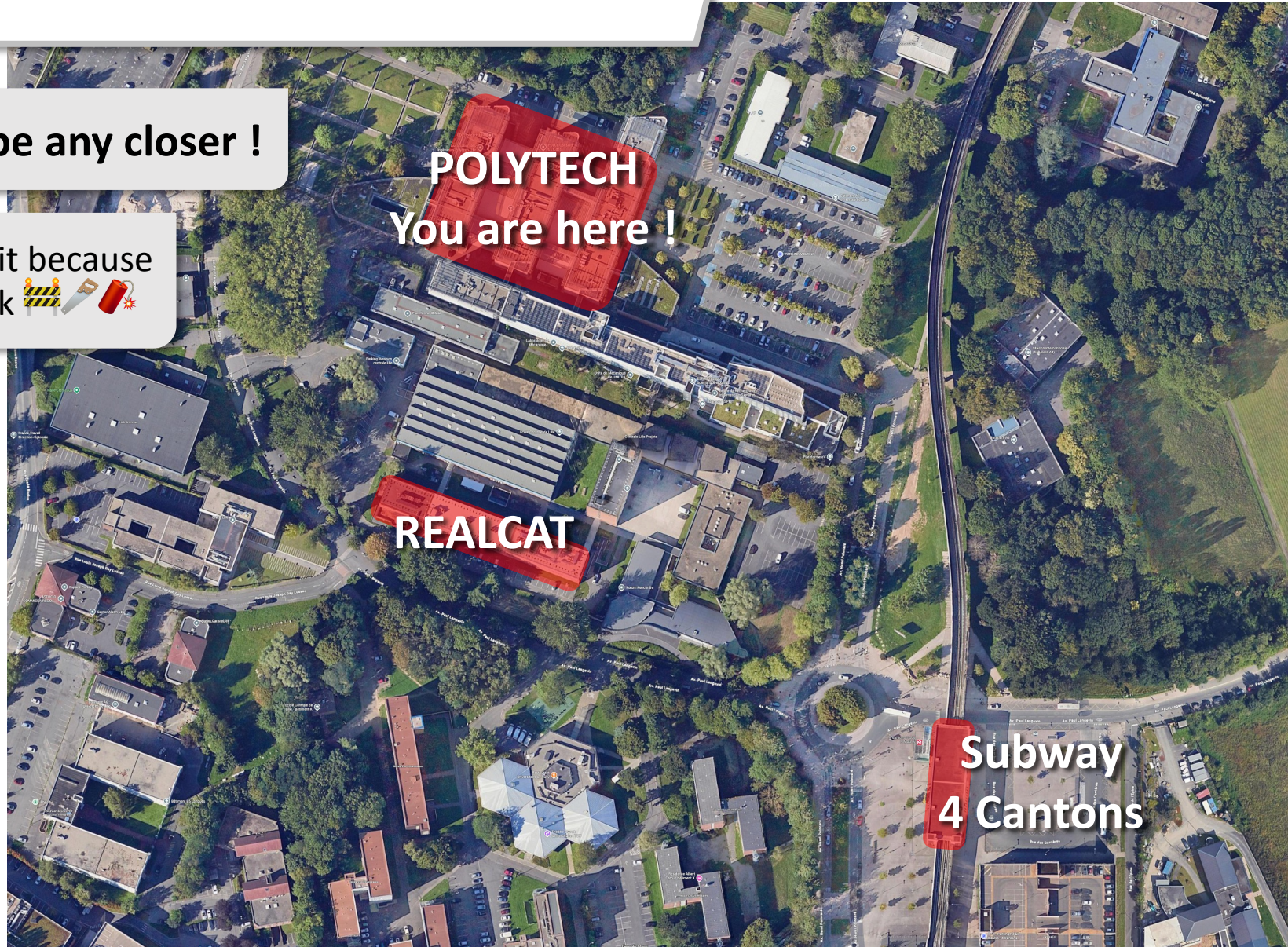
Pr. Rénato FROIDEVAUX
Pr. Vincent PHALIP
Dr. Egon HEUSON



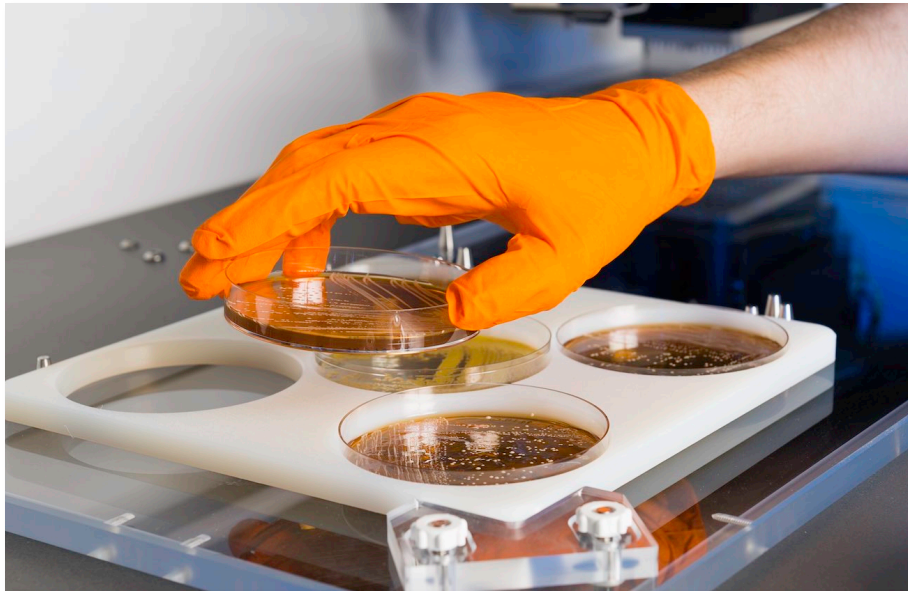
Where is REALCAT ?

We could not be any closer !

Sadly cannot visit it because
of renovation work 🚧 🔧 🔥



The platform's innovative concept

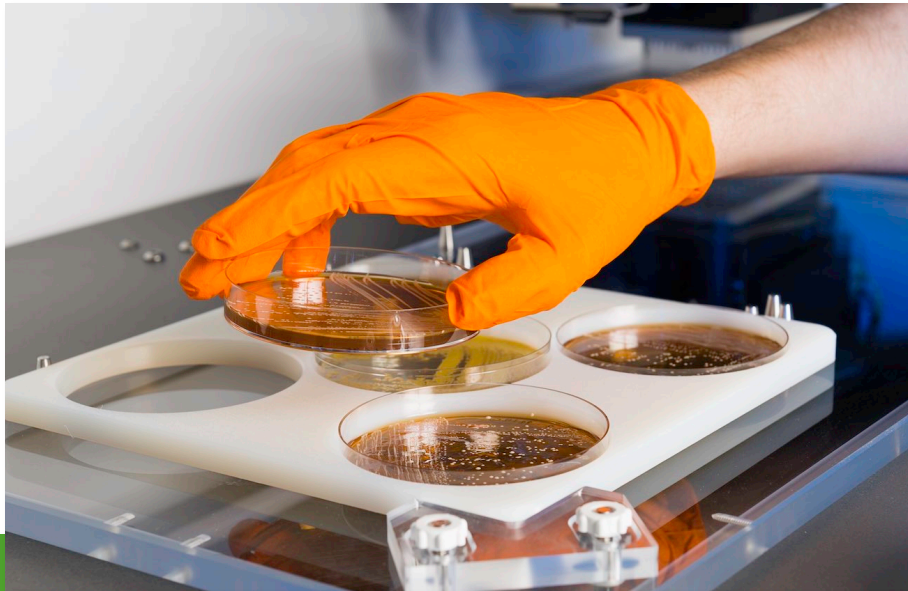


Biocatalysis
Micro-organisms & Enzymes
(Naturals or Engineered)



Chemical Catalysis
Supported & bulk catalysts
(Metallic particles, MOF, HPA, zeolite, ...)

The platform's innovative concept



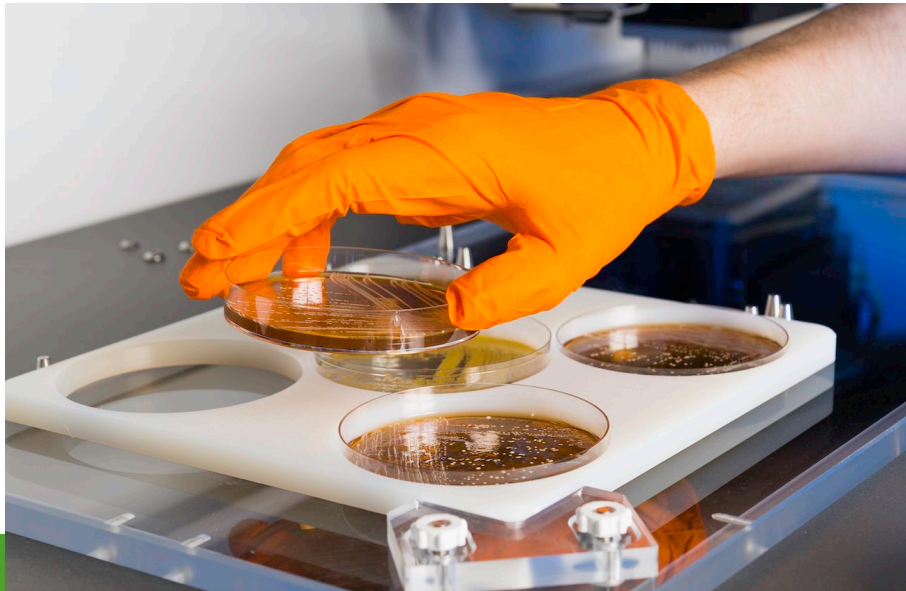
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Micro-organisms & Enzymes
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Hybrid catalysis
With combination
of both worlds in
the same reaction

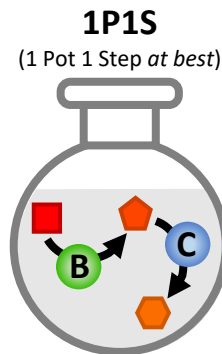


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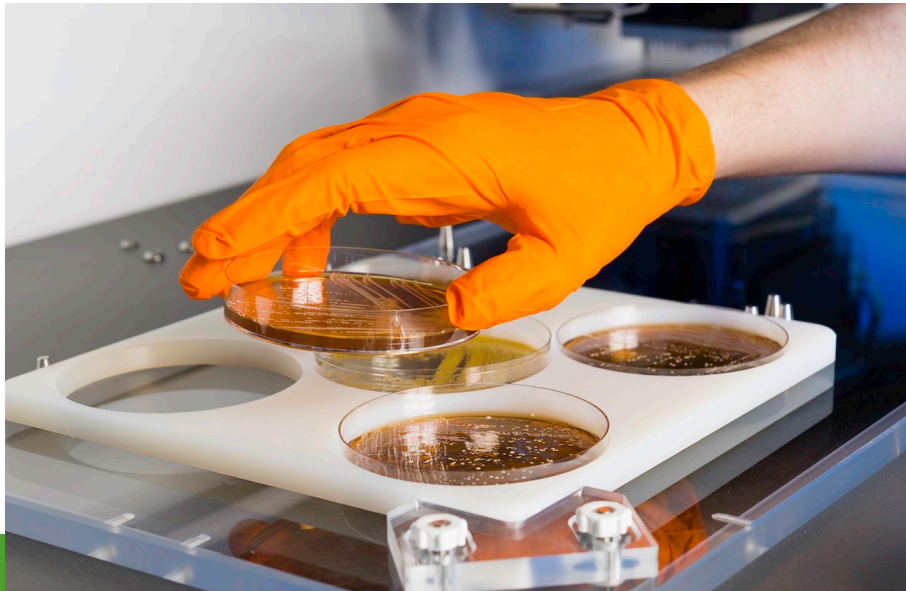


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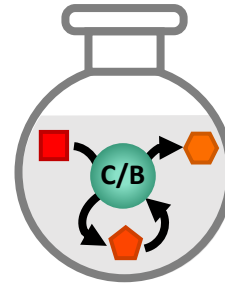
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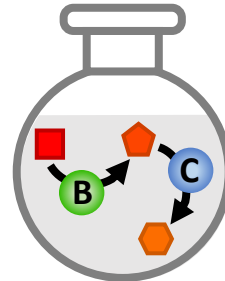


Biocatalysis
Micro-organisms & Enzymes
(Naturals or Engineered)

MCHM
(Multi-Catalytic Hybrid Material)



1P1S
(1 Pot 1 Step at best)



Hybrid catalysis
With combination
of both worlds in
the same reaction



Chemical Catalysis
Supported & bulk catalysts
(Metallic particles, MOF, HPA, zeolite, ...)

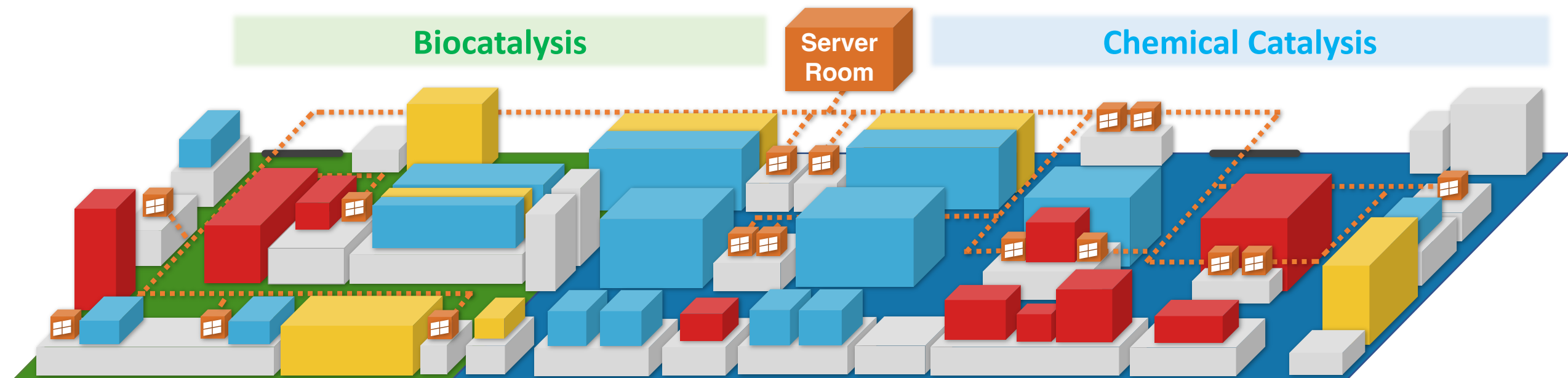
REALCAT's equipment

More than 30 high-throughput tools in 180 m²

Biocatalysis

Server
Room

Chemical Catalysis



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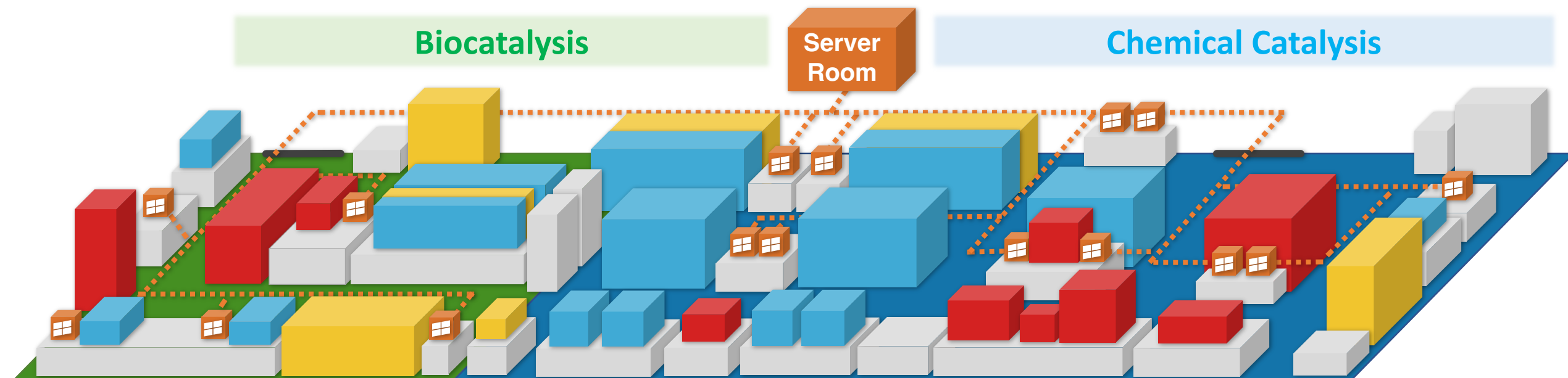


Synthesis or discovery
of catalysts

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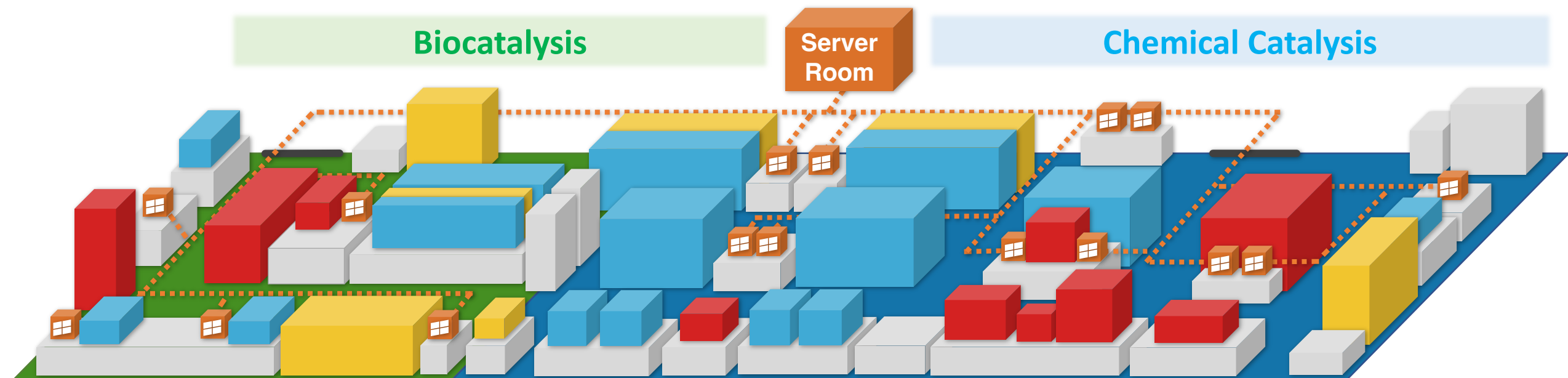


Evaluation & optimisation
of performances

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Chemical Catalysis



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Synthesis or discovery
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Evaluation & optimisation
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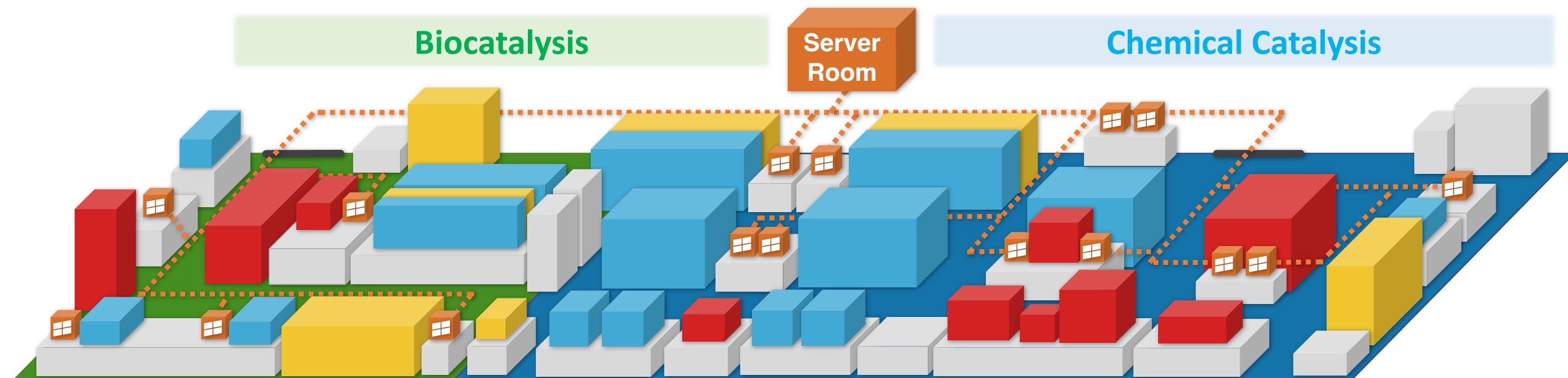


Characterisation of
catalysts and products

Biocatalysis

Server
Room

Chemical Catalysis



REALCAT's equipment



Synthesis or
discovery of catalysts



Evaluation & optimisation
of performances



Colony picking station

QPIX 460 (Molecular Devices)

- Camera assisted strain isolation (*up to 2 000 / hour*), replication and sorting (*agar to agar & agar to liquid*).
 - Antimicrobial activity and substrate degradation testing (*on surface & in agar*).
- 96 pins head, 40 destination plates, smart camera



Sterile pipetting stations

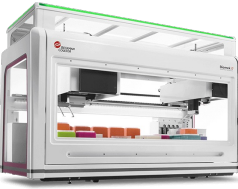
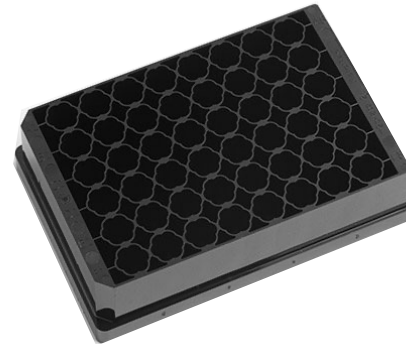
Biomek i7 (Beckman Coulter)

- Sample preparation, mutant/recombinant production, MALDI deposition ... (*Filtration/purification, heating, ...*).
 - Enzymatic & biochemical assays (*auto prep. & reading*).
- 96 tips + 8 smart tips/syringes, sterile enclosure, lum/abs/fluor-readers, filtration unit, Peltiers units, shakers, ...

REALCAT's equipment



Evaluation & optimisation
of performances



+

Microplate-based fermentation system with on-line monitoring of pH, dissolved oxygen and biomass

Biolector I (M2PLabs/Beckman Coulter)

→ Screening of strains (*libraries of mutants, environmental isolates, ...*) and culture conditions (*pH, C/N sources, gas, ...*).

→ Enzymatic, antibody, ... assays.

48 wells, light scattering/pH/PO₂/GFP/... , 12-50°C, pH 4,5-8,0, 0-1500 rpm, 0,8-2,4 mL, round- or flower-wells plates ...

Biolector II / Pro (M2PLabs/Beckman Coulter)

→ Biolector I capabilities plus :

- Micro-aerophilia.
- Lower pH limit (pH 3,5).
- Fed capabilities for pH control, delayed substrate addition, co-culture ... AND sampling with a Biomek !

REALCAT's equipment



Synthesis or
discovery of catalysts



Evaluation & optimisation
of performances

Much more **preparation** and
testing robots dedicated to
chemo- and **hybrid catalysis** !



Multi-tool preparer & tester



Microwaved preparations



Screening pressure reactor



Parallelised fixed bed reactors

REALCAT's equipment



Characterisation of
catalysts and products



UPLC-HRMS (Q-TOF)

UPLC - Synapt Xevo G2-Si HDMS (Waters)

→ Small molecules separation, detection & characterization (*low volumes & high sensitivity*).

Auto-sampler and 96-wells plates support, DAD, Q-TOF + IMS, 4-way pump, ...



MALDI (TOF-TOF)

Autoflex Speed (Bruker)

→ Big molecules analysis : polymers, lipopeptides, ... (*linear & reflectron, dedicated softwares modules*).

→ Strain identification by MBT (*Fast and reliable*).

Fast laser, 384 wells plates with multiple coating, dedicated softwares and databases, TOF-TOF LIFT

REALCAT's equipment



Characterisation of
catalysts and products



TLC system for qualitative and quantitative analyses

HPTLC : ATS4 ; ADC2 ; Derivatizer ; Visualizer 3 (Camag)

→ Precise and reproducible : depositing (*positions, volumes*), development (*migration front monitoring, humidity control*), derivatization (*for substances without chromo/fluorophores*) and image acquisition (*white or UV light*).

→ Prepared plates can be analysed in MALDI-TOF/TOF.

20x10 cm plates, 66 samples, microdroplet spraying, Vis-254-366nm with camera

REALCAT's equipment



Characterisation of
catalysts and products



GC analysis of products of reaction

GC 8890 - FID (Agilent) and GC 8890 - FID/MS - PAL 3 (Agilent ; PAL)

➔ Gas chromatographs dedicated for identification and quantification of volatile compounds
Autosampler with 150 cool-heat-controlled positions, headspace/SPME/SPME-arrow, FID/MS

REALCAT's equipment



Characterisation of
catalysts and products



LC analysis of products of reaction

HPLC-UV-IR-ELSD (Shimadzu)

→ High performance liquid chromatography dedicated to quantification of compounds in liquid sample
Refractive index detector, UV/visible detector with dual wavelength detection in the range 190-700nm, evaporative light scattering detector (ELSD) for sugar, lipids, polymers ...

LC analysis of products of reaction

HPLC-DAD (Shimadzu)

→ High performance liquid chromatography dedicated to quantification of compounds in liquid sample
DAD detector with dual wavelength detection in the range 190-800nm, autosampler with 384 positions

REALCAT's equipment



Characterisation of
catalysts and products

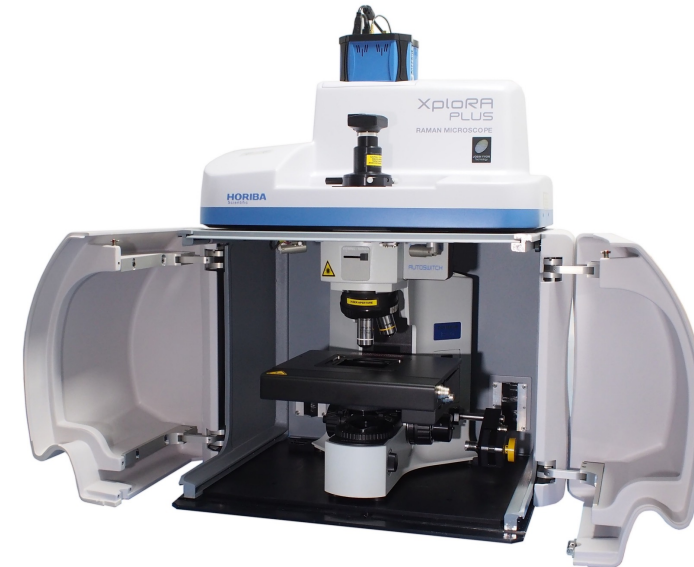


Fonctions analysis : Infrared Spectroscopy

Tensor 37-HTS (Bruker)

→ Identification of the nature of chemical bonds present in a solid or liquid sample

MIR Source spectral range from 8000 to 550 cm⁻¹, 2 detectors working in reflection and transmission mode



Fonctions analysis : Raman spectroscopy

XploRa (Horiba Jobin Yvon)

→ Chemical structure and identity, contamination and impurity, phase and the crystallinity, stress and strain for solid and liquid samples

Spatial resolution 1-2μm, single point and mapping, multiple laser wavelengths (532 nm, 638 nm and 785 nm)...

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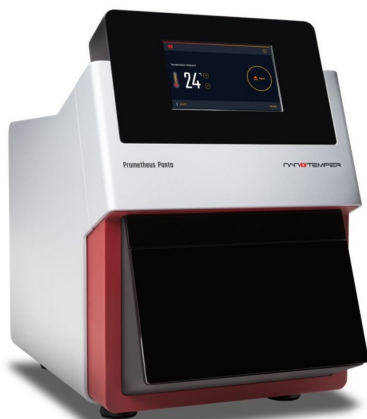


Multi-cuvettes reactor

Much more **characterisation tools** dedicated to **wider type of applications** !



CHNOS analysis



Protein stability & affinity



Strains identification



Textural analysis



ICP elemental analysis



X-Ray Elemental analysis

Quality of life systems

Users & Data Security

Gas leak detectors & Cameras

Data processing, Data Backups
& Confidentiality

Flexibility & Novelty

On-demand
original workflows

3D printing &
metal machining



We are here to answer your questions !

Website

<https://www.realcat.fr>

Productions



3D visit



Photos credits: Cyril FRESILLON ; Quentin HAGUET