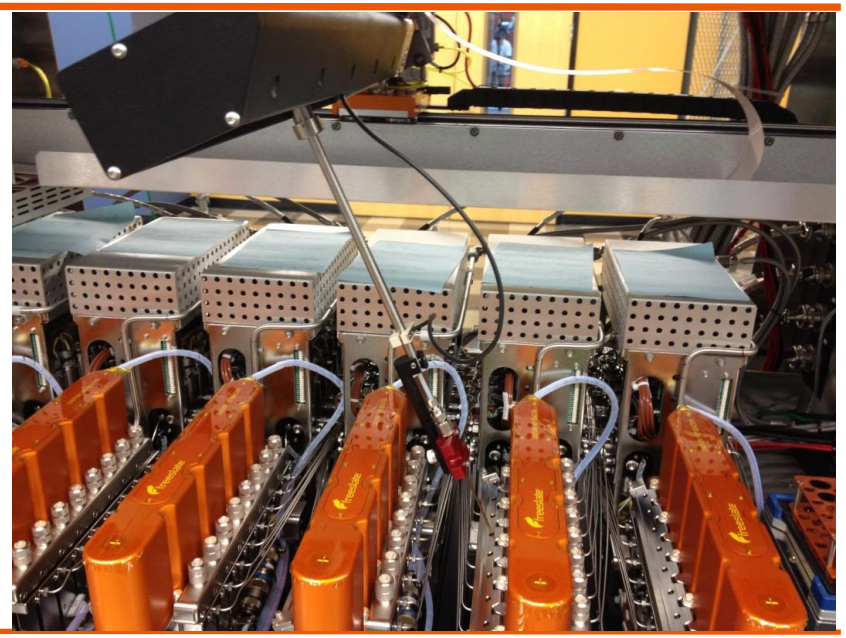
HTExplore, general presentation



Version: *2021.2*
Date: *May 2021*
Author: *Luca Rongo*

HTEXPLORE- ABOUT US

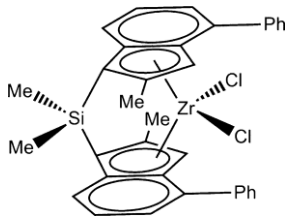
HTExplore is a high-tech company based in Naples offering comprehensive scientific and technology services linked to the development and application of High Throughput Screening (HTS) techniques to polyolefin catalysis.

Our scientific services, including catalyst screening and molecular polymer characterizations, are based on the sapient utilization of HTS tools and methods, enhanced by our intimate connection with the academic group LSP (led by Prof. Vincenzo Busico), thus creating a unique service offer for our customers of superior scientific quality. Furthermore, our embedment within the University of Naples enables us to access directly top-level competences and instrumentations for the physical and rheological characterization of olefin-based polymers.

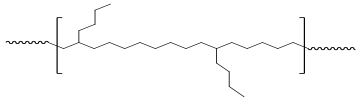
Since our establishment in 2013, we have served major petrochemical companies, as well as medium-size and R&D organizations, successfully delivering on >90 projects (~28˙000 polymerizations and ~22˙000 polymer analysis).

Current team: *2 engineers, 2 technician, 1 manager/scientific supervisor*

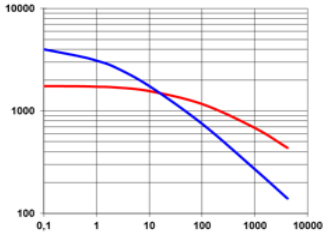
HTEXPLORE POSITIONING WRT PLASTIC CHAIN OF KNOWLEDGE



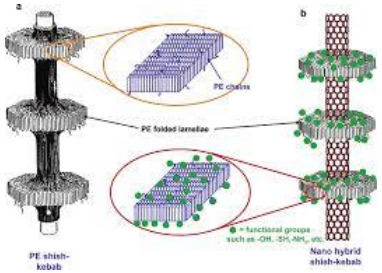
Catalysis process



Molecular structure



Polymer Processing

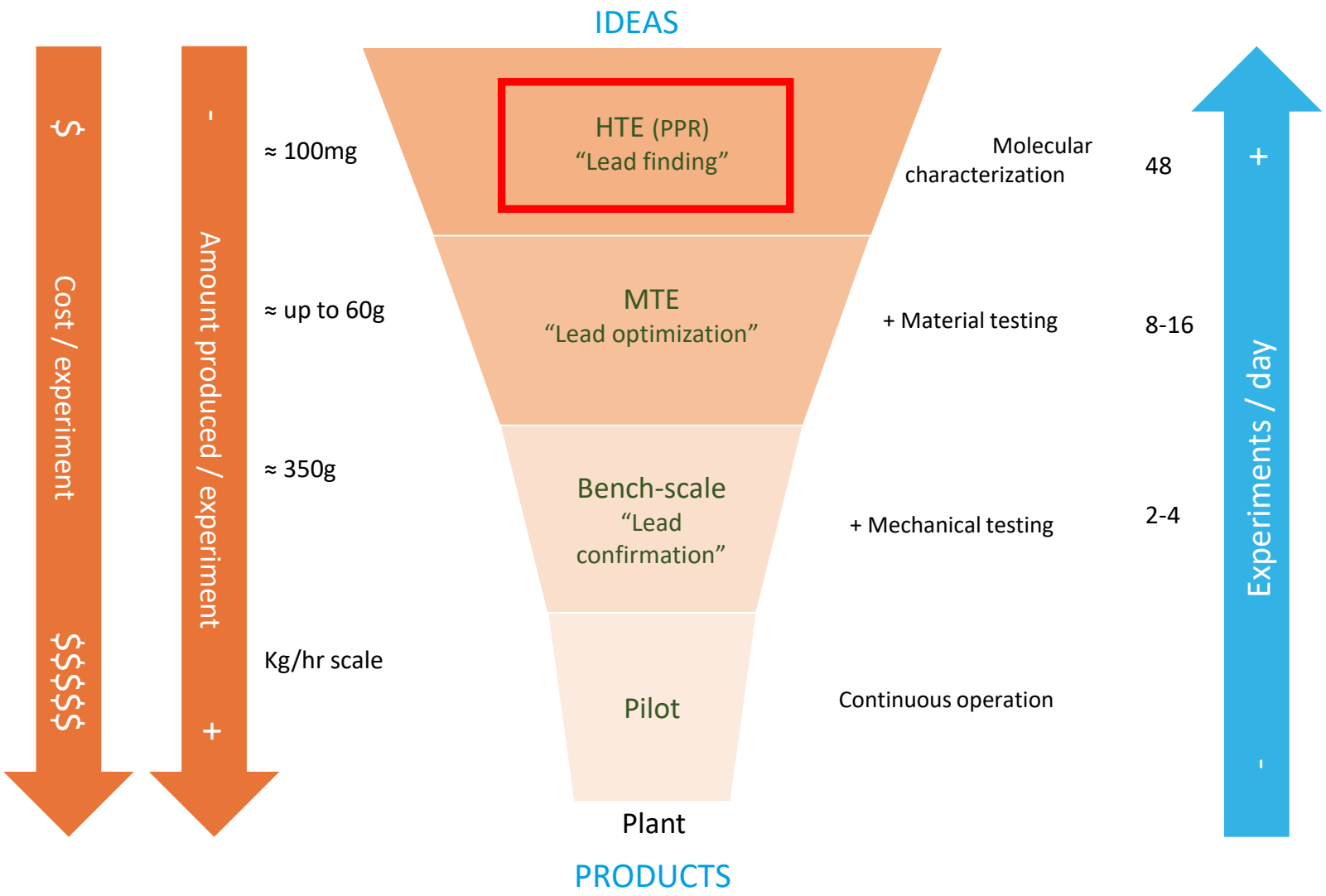


Morphology

Material Properties

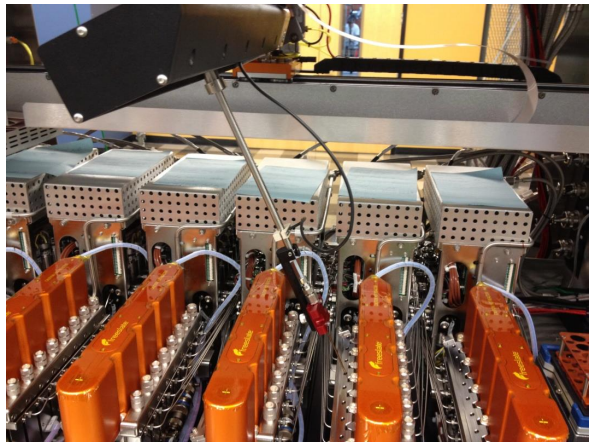
- *Chain-of-knowledge approach is **key** in developing new materials and new applications*
- *All new technologies/materials require a proper catalyst platform*

CONVENTIONAL APPROACH OF CATALYST RESEARCH IN POLYOLEFIN INDUSTRY



CURRENT PO CATALYSIS WORKFLOW AT HTEXPLORE

Polymerization



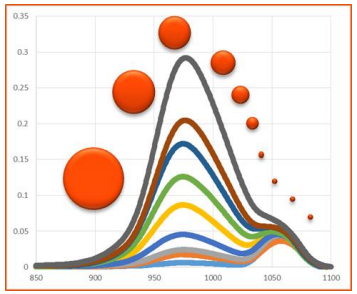
2x PPR48

Sample work-up

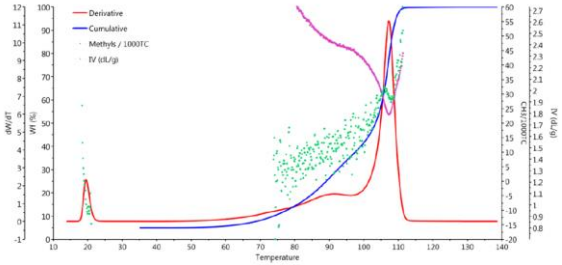
2x Christ Vacuum Concentrators

Molecular characterization

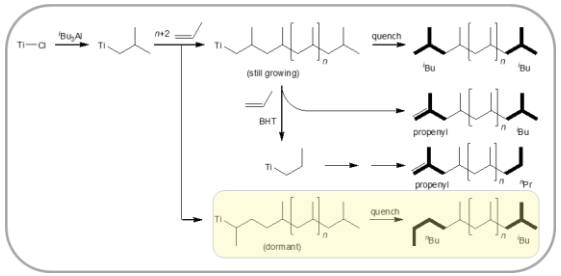
HT-GPC



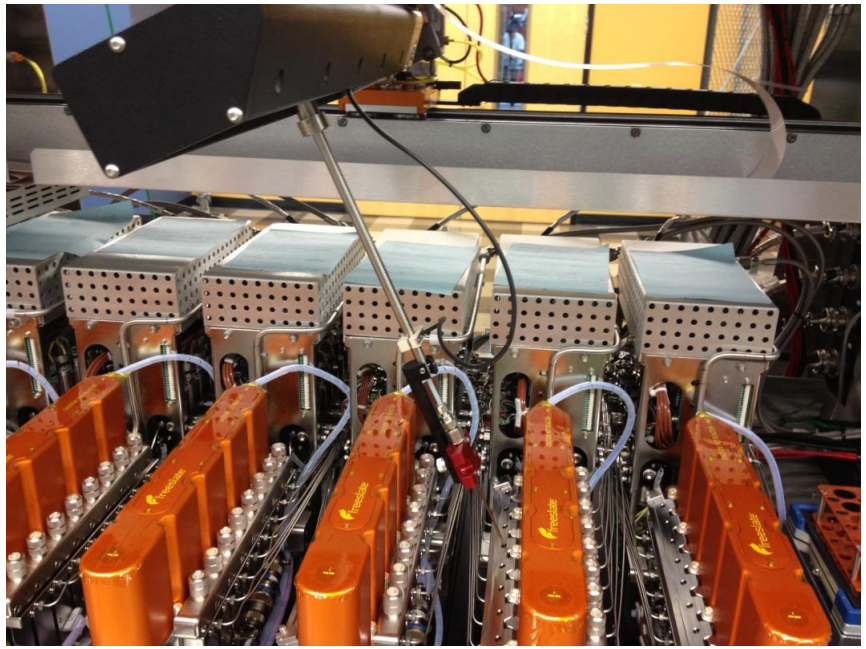
A-CEF

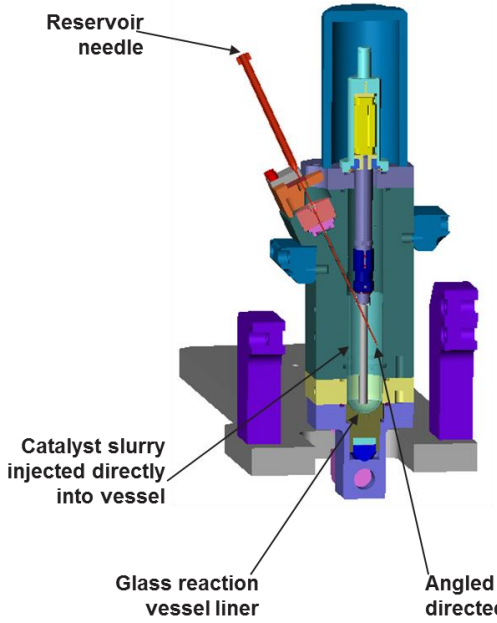


NMR



PPR48





- ✓ 48 mini-reactors (8 mL) consisting in disposable glass tubes and PEEK stir-paddles
- ✓ Used for slurry, bulk or solution processes (T up to 180°C and P up to 25bars)
- ✓ 2 robotic arms used for accurate liquid and slurry dispensing (+/- 5 ul)
- ✓ To be used for lead finding, primary screening and reaction kinetics studies
- ✓ Dedicated centrifugal drying station Genevac EZ-2 and Bohdan weigh station
- ✓ Placed in an inert atmosphere dry-box (nitrogen)
- ✓ Operation of the PPR using Freeslate LEA software suite.

INTEGRATED POLYMER CHARACTERIZATION PORTFOLIO

Freeslate HT-GPC

-Molecular Weight Distribution and associated parameters (Mn, Mw, Mz, PDI)

-Universal polystyrene-based calibration (1-3000KDa)

-Up to 48 samples/day (10mg required)

PolymerChar CEF

-Chemical Composition Distribution (for crystalline samples) with soluble fraction quantification

-Average compositional analysis for C2/C3, C2/C6 and C2/C8 copolymers

-Up to 24 samples/day (10mg required)

Bruker Avance 400 NMR

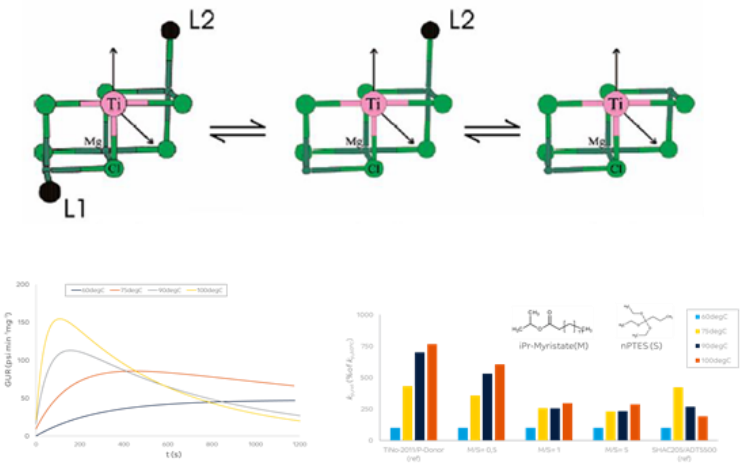
- ^{1}H- and ^{13}C-NMR with 5mm High Temperature Cryoprobe

-Microstructural and architectural analysis for most olefin-based polymers (tacticity, chain-end analysis, composition, sequence distribution, branching analysis, etc.)

- Up to 24 samples/day (50mg required)

HTEXPLORE SERVICE PORTFOLIO FOR THE POLYMER INDUSTRY

CATALYST SCREENING



- ✓ Lead finding under fixed or variable conditions
- ✓ Quantification of catalyst activity, comonomer affinity, hydrogen sensitivity
- ✓ Kinetic analysis based on accurate monomer conversion curves
- ✓ Process optimization (temperature, pressure and activation conditions)

MATERIAL OPTIMIZATION (at molecular level)

- ✓ Optimization of polymer composition for targeted applications
- ✓ Preparation and characterization of innovative compounds (e.g. olefin block copolymers, copolymers containing bulky olefins, terpolymers, copolymers of ethylene or propylene with functionalized monomers)

HTEXPLORE'S TYPICAL SERVICE PACKAGE

Our services are typically offered as packages of "PPR-libraries", each of which consisting of:

- 48 polymer synthesis (24 pairs, to safeguard data quality and ensure reproducibility), for which main process parameters are fully recorded (T, P and monomer conversion profiles)
- 48 GPC analysis
- 24 ^{13}C NMR analysis (tailored on the type of material)
- 24 CEF analysis

The following activities/services are always included (irrespective of the no. of Libraries, at no additional costs):

- Preparative experimental work (i.e. pre-determination of some reaction conditions, proper catalysts scaling, etc.)
- Preparation and discussion meetings
- Data analysis and interpretation
- Full reporting
- Data and polymer ownership

Pricing highly depends on the type and size of the project. Different arrangements can be discussed.

CONTACT DETAILS

Contac links:

E-mail: info@htexplore.com

Website: www.htexplore.com (under renovation)

Main contact person:

Dr. Luca Rongo, GM sales and marketing

Email: luca.rongo@htexplore.com

T: +39 3882559312

Addresses:

Legal: Via Rodolfo Morandi, 12 – 80124 Napoli (Italy)

Operation and shipments: c/o Dip. Scienze Chimiche, Università di Napoli Federico II – Via Cintia – 80126 Napoli (Italy)