Application of Microwaves in Chemical Processes

INSTITUTO MAUÁ DE TECNOLOGIA

MAUÁ

RESEARCH GROUP

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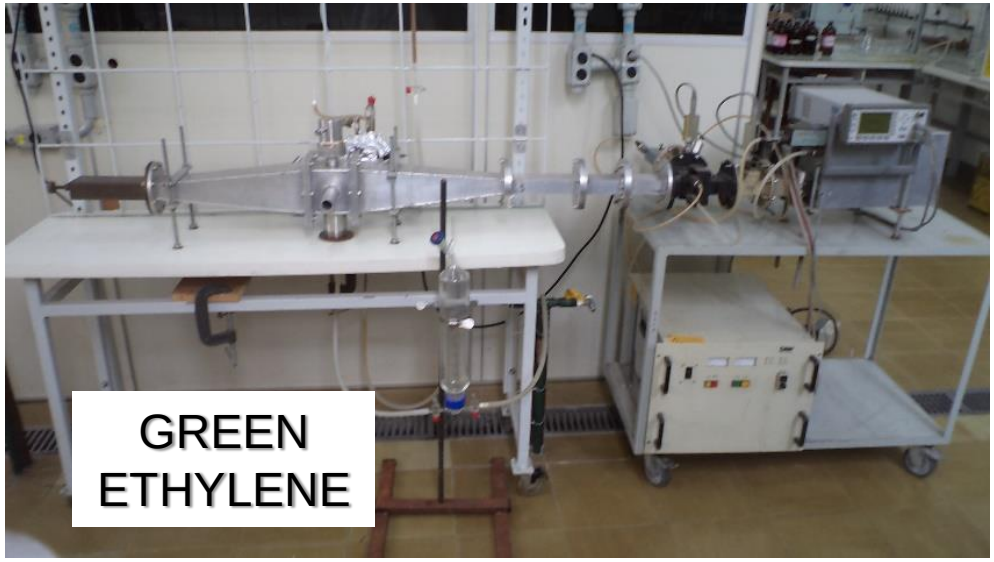
Microwave Laboratory
Rooms: H.141-142, and H.357)

The group works with R&D in industrial microwave processes. Its improvement, optimization and innovation are the core activity, including the equipment involved in them. The main objectives are the increase of productivity and product quality.

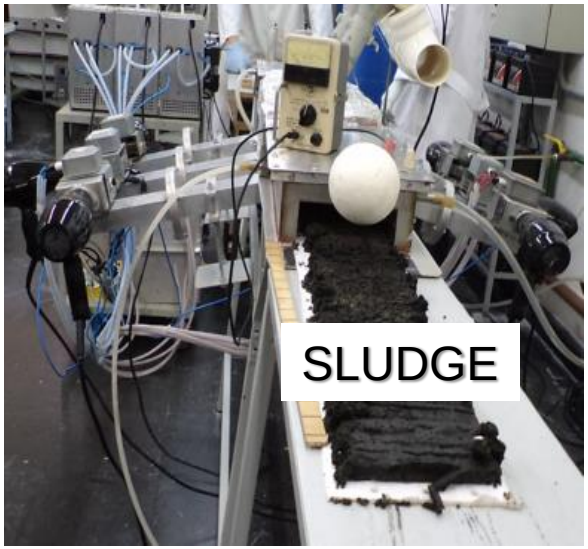
AREAS OF EXPERTISE

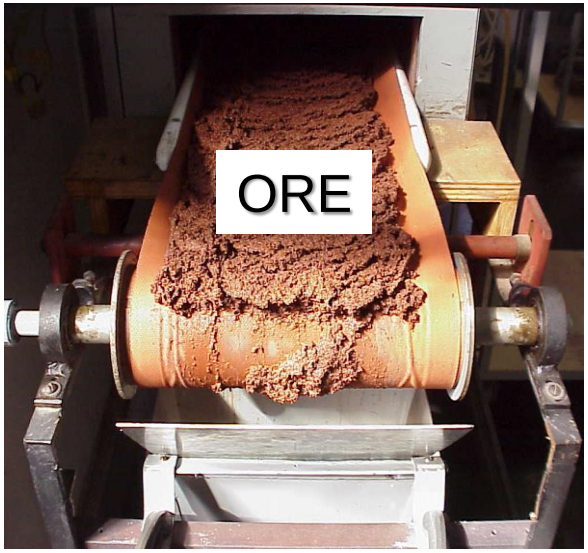
CHEMICAL SYNTHESES



AREAS OF EXPERTISE

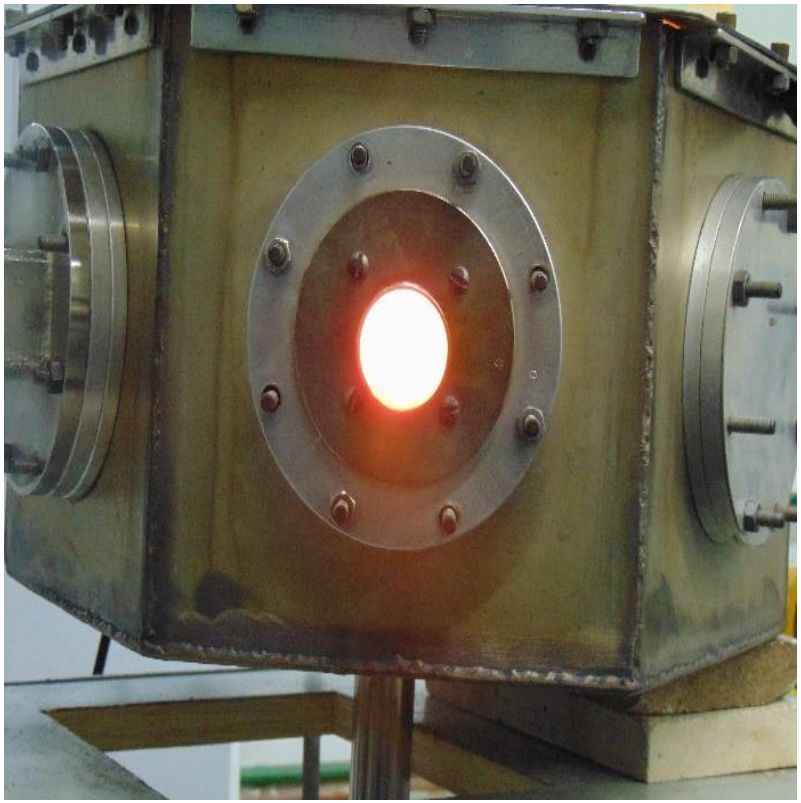
CONTINUOUS AND BATCH DRYING

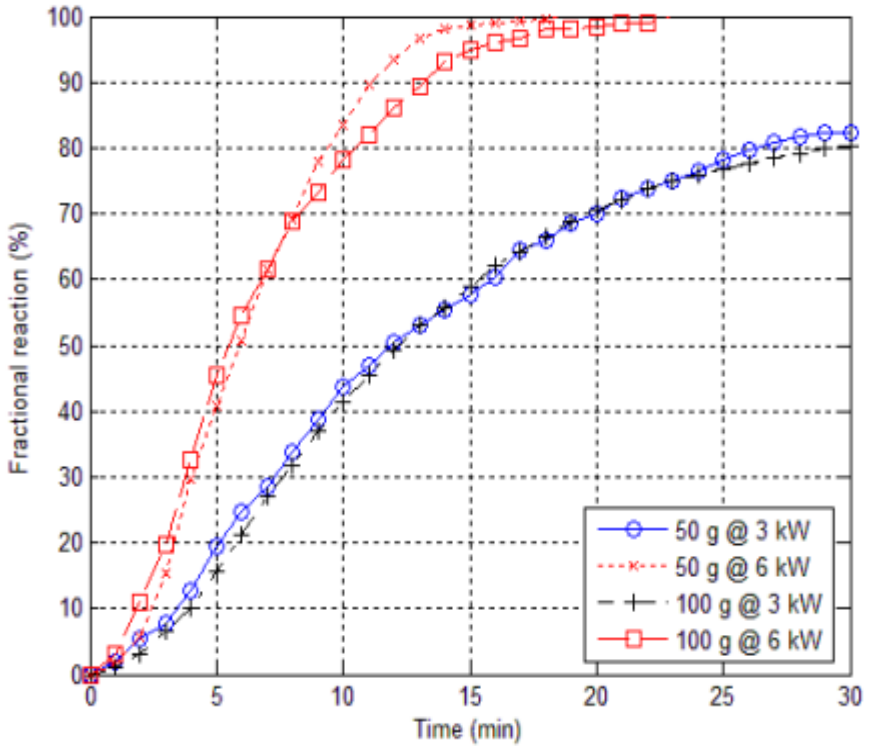




AREAS OF EXPERTISE

CARBOTHERMIC REDUCTION OF METAL OXIDES





Reaction rate as a function of exposure time: hexahedrical cavity.

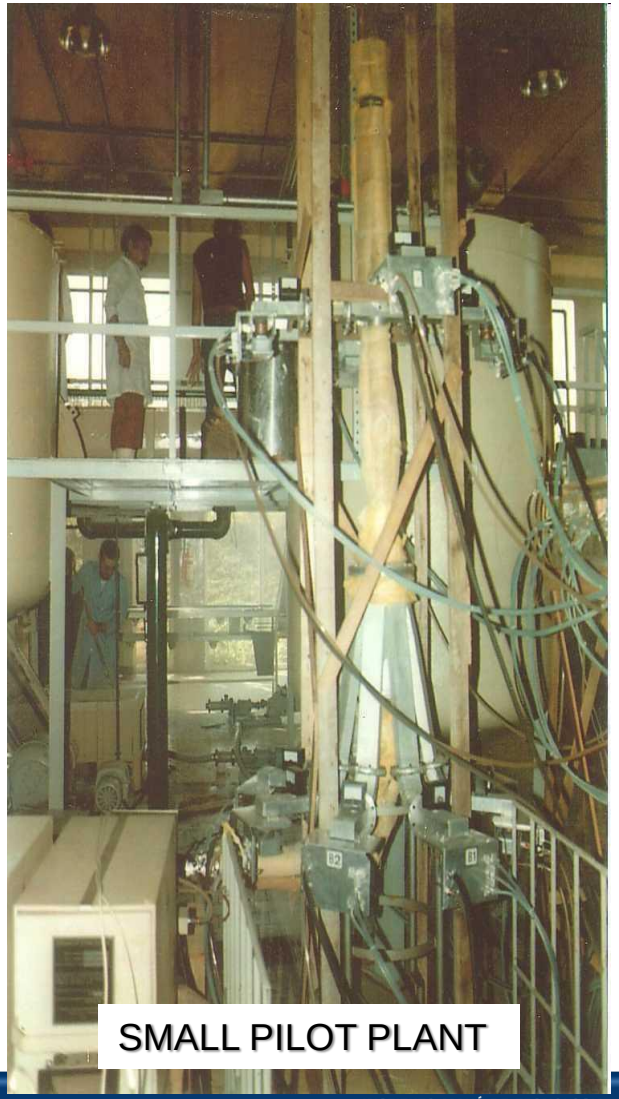
Left image shows an equipment designed to reduce self-reducing pellets (iron ore + carbonaceous reducer) with microwave energy. It enables the recording of the reaction rate, temperature, and energy involved by the process.

AREAS OF EXPERTISE

APPLICATOR DEVELOPMENT

CYLINDRICAL FURNACE FOR IRON ORE REDUCTION

COOLER



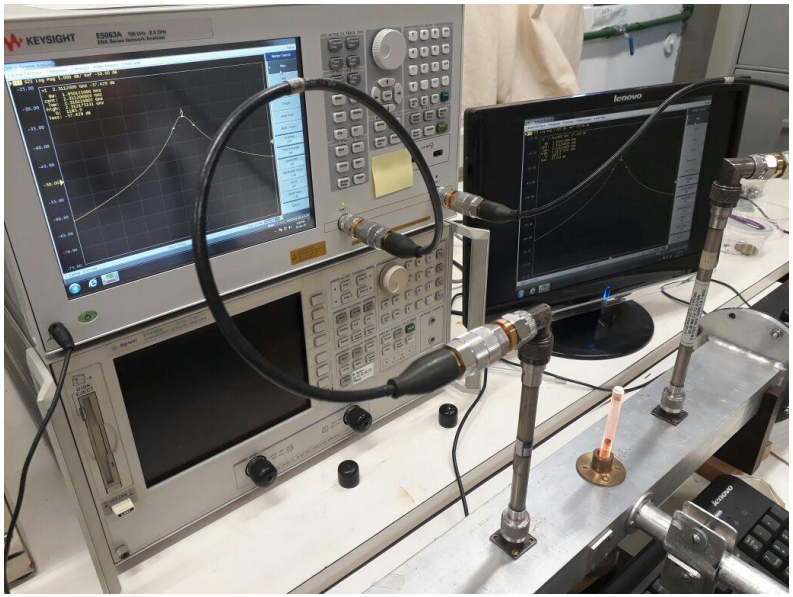
SMALL PILOT PLANT

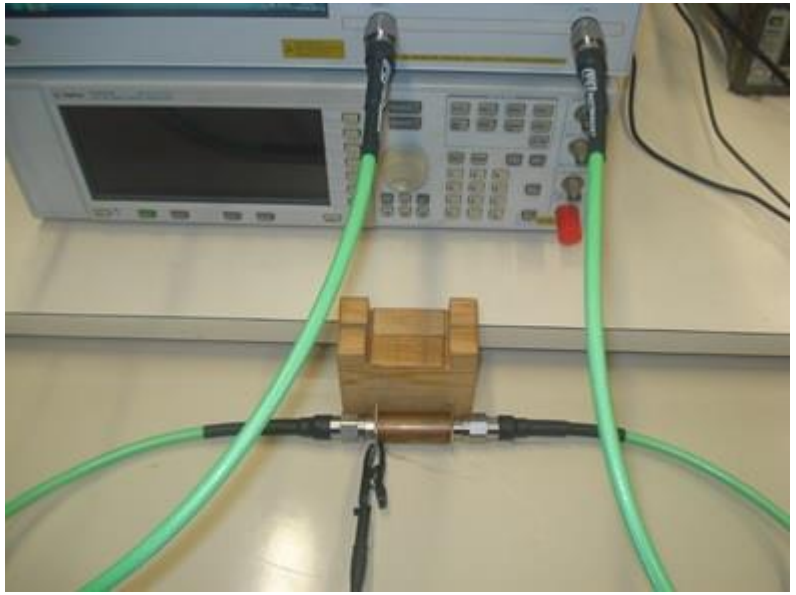
PASTEURIZER

2nd. GENERATION ALCOHOL

AREAS OF EXPERTISE

ELECTROMAGNETIC CHARACTERIZATION OF SOLID AND LIQUID MATERIALS

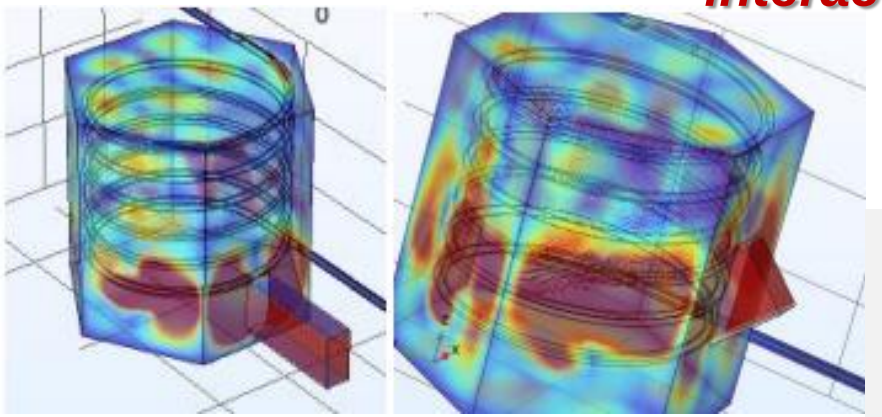


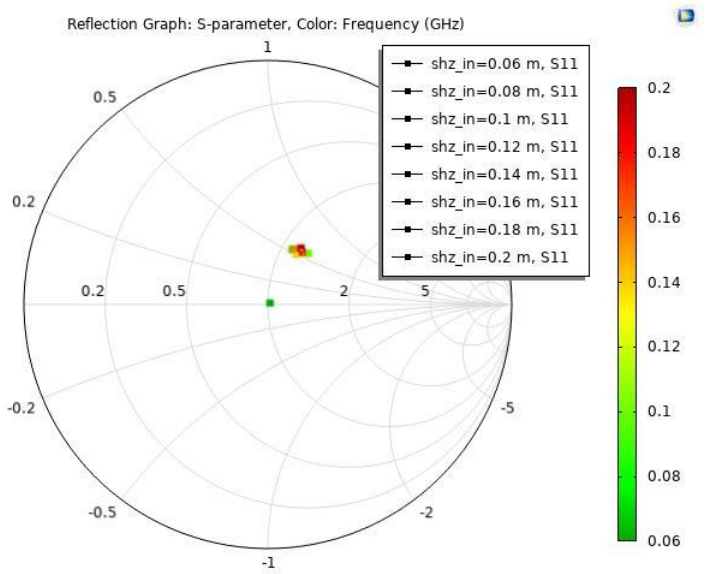


The knowledge of the electromagnetic properties of materials is needed to help the project of applicators and reactors. Solid and liquid materials can be characterized in our facilities and parameterized in function of temperature.

AREAS OF EXPERTISE

MULTIPHYSICS SIMULATION: Electromagnetic, thermal, and fluid interaction





Processes that involve various materials and complex geometries, have no analytic solution. Realistic computer models are needed to reduce the time spent on the project!

AREAS OF EXPERTISE

NEAR INFRARED SPECTROSCOPY

Development of calibration models for quantification of various substances in solid or liquid matrices.

Near Infrared Reflectance (NIR) is a fast and high-precision technology that uses the natural electromagnetic radiation emission to carry out analysis to find out the chemical composition of food and other organic samples (and even some inorganic ones).

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