



Universidad
Zaragoza

GPT
Thermo-Chemical
Processes Group



GRUPO DE PROCESOS TERMOQUÍMICOS (GPT)



<http://gpt.unizar.es>
gpt@unizar.es



Instituto Universitario de Investigación
en Ingeniería de Aragón
Universidad Zaragoza

Who we are:

The Thermochemical Processes Group (GPT, Grupo de Procesos Termoquímicos), is a **Spanish research group** developing its work at the framework of the **Aragón Institute for Engineering Research (I3A)**, one of the research Institutes at the **Universidad de Zaragoza (Spain)**.

Since the foundation of the group, in 1983, The GPT has been focused on the valorisation of residues by thermochemical processes, specifically by pyrolysis and gasification, although research lines on other processes such as combustion (gas phase reactions dealing with contaminant generation), pulp and paper or biodiesel production are also active. The GPT has also developed a vast research activity on developing kinetic models for combustion processes in gas phase.



Main objectives:

To contribute to scientific knowledge of these processes, as well as to carry out the development of these technologies at pilot and demonstration scales. Design and optimization of processes, from the efficiency and environmental security points of view, are also sought. In order to achieve these objectives, experimental studies and process modeling are carried out.

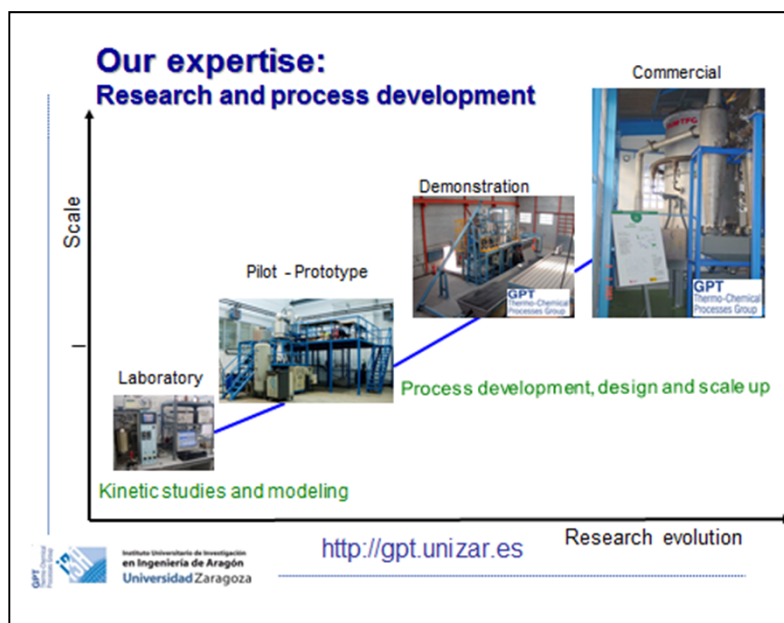


Our expertise:

The GPT is a scientific group oriented toward academia and sharing knowledge via publications in high quality peer-reviewed scientific journals listed in the Journal Citation Report (JCR) system. Nevertheless, the GPT can also work as a consultant company and as a R&D group aiming toward providing a service to private companies and corporations.

The group's work methodology can be described as follows: Firstly, the studies are initiated in the laboratory and, after the analysis of the results and the data,

the processes are subjected (when appropriate) to a scale-up. These data are used for the development of computational models that allow process simulation under a variety of conditions. Hence, the processes are developed through different scales, conducting the design, setup construction, and research from laboratory, through bench and pilot scale, up to a demonstration scale and even to a turnkey commercial scale. Thus, large investments and funding are required, obtained from both public and private sources, via projects with financial support from regional, national and international organisms, or through agreements and contracts signed with different companies and corporations.



Main research lines

The group has great insight on the thermochemical conversion and valorisation of residues, particularly, lignocellulosic residues, as well as on the study of gas-phase reactions and pollutants minimization in combustion processes, including the development of detailed chemical kinetic models for describing hydrocarbon conversion and pollutant minimization. Different feedstocks and raw materials have been studied, including lignocellulosic and agroforestry residues, sewage sludge, meat and bone meal, plastics, waste tyres, spent liquors from the pulp and paper industry (black liquors), biomass oxygenate compounds and bio-oils, and residue-derived fuels (RDF) from municipal solid wastes.

Up to date, five major research lines are being carried out by the GPT. The lines are listed below:

- **Pyrolysis and gasification**
- **Combustion and pollutant emissions (NO_x, SO_x, soot, ...) reduction**
- **Detailed kinetic modeling for combustion processes**
- **Pulp and paper production from agroforestry residues and black liquor valorisation**
- **Biofuels production (biodiesel, bio-hydrogen, bio-oil, bio-char, etc.) and conversion of products of interest for automotive fuels**



Example of projects developed

The Thermochemical Processes Group has collaborated with different institutions and companies. Several research projects and initiatives have been carried out. An example is presented below. For a detailed list of relevant research projects please check the group's website (<http://gpt.unizar.es>):

"Gasification of sewage sludge and compost in a fluidized bed pilot plant".

- Funded by : Environmental Ministry (Spain)
- Institutions: University of Zaragoza, TAIM- TFG (now TAIM-WESER)
- Period 2005 - 2007
- Budget (U. Zaragoza): 531,190 €
- Description: Design, construction and operation of a fluidized bed gasification pilot plant with a processing capacity of 15-20 kg/h, using sewage sludge and compost as feedstocks. As a result of this project, TAIM-WESER awarded the GPT a private contract for a joint design, construction and setup of a commercial-scale 700 kWe downdraft gasifier.

Biofuels Research Infrastructure for Sharing Knowledge (BRISK)



The Thermochemical Processes Group is one of the 26 partners that constitute this consortium, funded within the 7th Framework Programme of the European Union. BRISK opens up a wide variety of research infrastructures via Transnational Access, allowing researchers outside and inside the project to conduct experiments. Therefore, BRISK's main activity is to fund researchers from any EU and qualifying country to carry out research at any of the 26 partner's facilities. Further details on BRISK can be checked in <http://www.briskeu.com>.

- €10.84M four-year initiative with €8.98M funded under EU 7th Framework Programme (Ref: 284498)
- From October 2011 to September 2015.
- 26 partners all over Europe (Coord.: KTH, Sweden)
- Open to collaborations – both internal and external users

COST Action CM0901



The GPT is a member of the Management Committee in the COST Action CM0901 – Detailed Chemical Kinetic Models for Cleaner Combustion. COST (European Cooperation in Science and Technology) is one of the longest-running European frameworks supporting cooperation among scientists and researchers across Europe.

The main objective of the Action is to promote the development of cleaner and more efficient combustion processes through the design and implementation of better defined and more accurate chemical kinetic models. It is a 4-year initiative with an economic dimension of the activities carried out under the Action estimated in ca. 84 M€. The Action started on March 2010 and will finish at the end of April 2013. More details on the Action and further information can be accessed on the Action's website:

<http://cost.ensic.univ-lorraine.fr/cost/>

European Energy Research Alliance Joint Programme on Bioenergy



The GPT plays a part in the role of the Universidad Zaragoza as an associate member in the EERA Bioenergy Joint Programme. EERA Bioenergy activities focus on joint strategies and the creation of joint research project proposals that support large research infrastructure, human mobility, promotional and dissemination activities. The EERA Bioenergy programme was launched at the end of 2010 in its first phase for three years. There are 24 RTD institutions participating from 13 various countries. Currently there are four Sub Programmes (SP) in the EERA Bioenergy Joint Programme:

- Biomass thermochemical processing – SP1
- Sugar Platform – SP2
- Biofuels from algae – SP3
- Cross-cutting issues in bioenergy – SP4

Further information can be found in:

<http://www.eera-bioenergy.eu>

