

The 3rd Advances in Green Chemistry  
**BOOK OF ABSTRACTS**

Poznan, Poland  
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Poznan 2022

## About 3<sup>rd</sup> Advances in Green Chemistry

The aim of our conference is to create a place where leading scientists, both from Poland and Europe, will be able to share their latest achievements in five key research areas related to green chemistry, i.e., the area of ionic liquids, materials research, electrochemistry, catalysis and biosciences. The conference is to provide an impulse for scientists to discuss current research in these areas, initiate a discussion on the implementation and commercialization potential of the results, and be a platform for the emergence of new research ideas. This international meeting will create an environment which will promote the formation of new research partnerships between scientists from around the world, using their specialized knowledge and experience in specific areas. Special mention at **3<sup>rd</sup> AGChem** will have the technology of modern ecological materials, i.e., polymers, as well as the results of research on technologies for obtaining and recovering raw materials for their production. The thematic areas of the conference constitute of an entirety of research on green technologies, combining catalytic processes of production or processing of raw materials with application in electrochemistry (energy storage, energy acquisition) or biosciences. We would like to strongly emphasize the importance of research on ionic liquids as substances with versatile possibilities and great potential in virtually every thematic area of the conference. Ionic liquids are significant in the industry of the future; therefore they have their own thematic area at **AGChem 2022**. Close relationship between basic research and industrial exploitation of the results is the main idea behind this conference. International cooperation is the motto that should define this conference. We want the technologies and research presented by scientists to show the possibilities that they will provide to the society, what processes they improve and, most importantly, how they affect the environment. Everything that will be discussed at the conference will concern broadly understood term of green chemistry. These will include waste recycling technologies and their reuse or improvement of production processes, in which the impact on the natural environment will be reduced. In addition, we want to present the results of research on technologies dedicated to the circular economy and how research concepts are created in these areas "from idea to implementation". Another issue is the production of bio-based materials and biomaterials, considering environmental aspects and adapting new technologies to the changing global pro-ecological policy. Important, from the point of view of the end recipients - society, research in the areas of biosciences and agriculture will be presented, where we want to put special emphasis on research and implementation works on technologies that eliminate the use of plant protection products, for which there is no longer a place in the sustainable economy of the future. **AGChem 2022** is a conference that aims to show the scientific community and industry where we are in the areas of green chemistry, what we are currently working on and what research directions we have in global terms and present what we have already implemented.



**Marcin Śmiglak**  
Conference Chair



# Abstracts

in alphabetical order by name of the author





## Evaluation of temperature on the pyrolysis of residual biomass

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Residual biomass is considered a critical potential source for renewable and sustainable generation of fuels, chemicals and other carbon-based materials for mitigation of the greenhouse effect and climate changes, due to its carbon neutrality and being a non-polluting energy source. Among technologies for biomass conversion, pyrolysis is widely used. It consists of a thermal decomposition process in an atmosphere without oxygen, to convert biomass into biochar, bio-oil and gases, generating no waste during the process [1].

Pellets were used as biomass sources, and the Pyrolysis tests were performed in a fixed-bed vertical pyrolysis oven, with a maximum temperature between 500 and 700 °C, a heating rate of 40 °C /min, a retention time of 0.5 h and an N<sub>2</sub> flow of 20 mL/min. The results of the tests are shown in Figure 1.

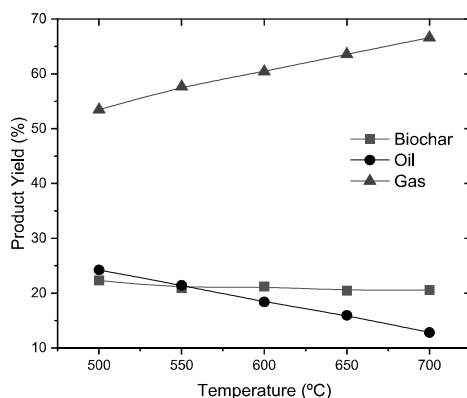


Figure 1. Effect of temperature on the yield of biomass pyrolysis products

The increment of the maximum temperature caused a variation in the products yields. For the biochar fractions, the increment of heating rate diminished its yield and raised the gas fraction yield. This phenomenon is expected, as higher temperatures could crack the heavy molecules biomass components, into smaller ones, generating more gaseous particles at cost of biochar yield [2]. Pyrolysis of biomass proved to be a viable technology for the valorization of a worldwide produced waste. The maximum pyrolysis temperature proved to be a critical element for this process, as higher temperatures enhance the production of the gas fraction, whilst reducing the solid fraction.

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### References:

- [1] W. Cai et al, *Fuel Processing Technology*, **221**, (2021) p. 106919
- [2] J. Han and H. Kim, *Renew. Sustain. Energy Rev.*, **12**, (2008) p. 397

