



# 9<sup>th</sup> IUPAC International Conference on Green Chemistry

5-9 September 2022, Athens, Greece

Venue: **Zappeion Megaron** | [www.greeniupac2022.org](http://www.greeniupac2022.org)

Physical and Virtual

## CONFERENCE PROCEEDINGS



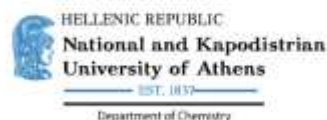
Organized by:

Association of Greek Chemists

In collaboration with:

IUPAC Interdivisional Committee on Green Chemistry for Sustainable Development

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Dear Colleagues,

On behalf of the Association of Greek Chemists (AGC) and the IUPAC Interdivisional Committee on Green Chemistry for Sustainable Development (ICGCSD), we would like to welcome you to the **9th IUPAC International Conference on Green Chemistry (9th ICGC)**, which is taking place on 5-9 September 2022, in Athens, Greece, at Zappeion Megaron, offering the choice of virtual participation. The 9<sup>th</sup> ICGC is endorsed by IUPAC, EuChemS, ACS, the Hellenic Green Chemistry Network, the Green Sciences for Sustainable Development Foundation, and the Departments of Chemistry of Aristotle University of Thessaloniki and of National and Kapodistrian University of Athens. The 9<sup>th</sup> ICGC is the ninth of a series of ICGCSD/IUPAC successful conferences on Green and Sustainable Chemistry that started 16 years ago in Germany (2006), followed by the conferences in Russia (2008), Canada (2010), Brazil (2012), South Africa (2014), Italy (2016), Russia (2017) and Thailand (2018).

The IUPAC ICGC conferences offer the opportunity to discuss the latest developments in green & sustainable chemistry, to expand existing and establish new relations among academia and industry, and to disseminate the philosophy and principles of sustainable development and circular (bio)economy. The topics of the 9<sup>th</sup> ICGC cover the broader field of green chemistry and technology with more emphasis on green solvents, sustainable catalytic and synthetic processes, biomass conversion to fuels, chemicals and polymers, CO<sub>2</sub> utilization, alternative fuels and green energy, benign low-energy chemical processes, nanomaterials for energy and the environment, pollution prevention and remediation, computational chemistry, green chemistry metrics and environmental assessment, sustainable industrial processes, waste recycle and valorization, and circular (bio)economy.

The conference program consists of 9 Plenary and 17 Keynote Lectures, ~200 Oral and ~300 Poster presentations. Five Special Issues will be dedicated to the 9<sup>th</sup> ICGC, in the journals *Pure and Applied Chemistry* (De Gruyter), *ACS Sustainable Chemistry & Engineering* (ACS), *Green Chemistry* (RSC), *Sustainable Chemistry and Pharmacy* (Elsevier), and *Catalysis Today* (Elsevier), featuring selected high-quality papers presented at the conference.

We would like to thank the Plenary and Keynote speakers for accepting our invitation to deliver a lecture, all the authors who have dedicated important time in preparing their abstracts and presentations, as well as all session chairs for ensuring a smooth flow of the programme. We would also like to thank all the organizations and companies that supported the 9<sup>th</sup> ICGC financially and offered the means for organizing a high-quality conference.

We look forward to welcoming you at the 9th ICGC in Athens or on-line and have a fruitful and enjoyable conference!

On behalf of the Organizing Committee,

Konstantinos Triantafyllidis

Chair of the 9th ICGC

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## A new synthetic approach to dialkyl carbonates and their use as green solvents for the preparation of PVDF membranes

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Dialkyl carbonates (DACs) are well-known green solvents and reagents that have been extensively investigated as safe alternatives to chlorine-based compounds. In fact, they can replace alkyl halides and dimethyl sulfate in alkylation and carbonylation reactions as well as phosgene and its derivatives in alkoxy-carbonylation ones [1]. Recently we have developed a high yielding scale-up synthesis of non-commercially available or expensive DACs via transcarybonylation reactions of an alcohol with dimethyl carbonate (DMC) promoted by the nitrogen-based organocatalyst 1,5,7-triazabicyclo[4.4.0]dec-5-ene TBD [2]. Compared to previously published works, [3] the proposed procedure has been customized for DACs large scale production (up to 100 mL of product obtained). Purification of these compounds has been achieved by fractional distillation and the exceeding reagents have been recovered and recycled. Selected DACs for this study include both symmetrical and unsymmetrical compounds, incorporating several alkyl, alkoxyalkyl, alkylamino and alkylthio functional groups. Chemical-physical properties of the new DACs have been also evaluated, as well as their water solubility. Furthermore, biodegradability and cytotoxicity tests have been carried out to investigate the effects of the different substituents on the greenness of these potential solvents and reagents. DACs application as green solvents for membrane preparation was next investigated, using non-solvent induced phase separation (NIPS) and vapor induced phase separation (VIPS) techniques, achieving both porous and plain membranes [4]. Morphology, additives effect, physical-chemical and mechanical proprieties as well as their performances in terms of water permeability and rejection were evaluated and compared to membranes obtained using commercially available cyclic carbonates (namely ethylene carbonate – EC and propylene carbonate – PC).

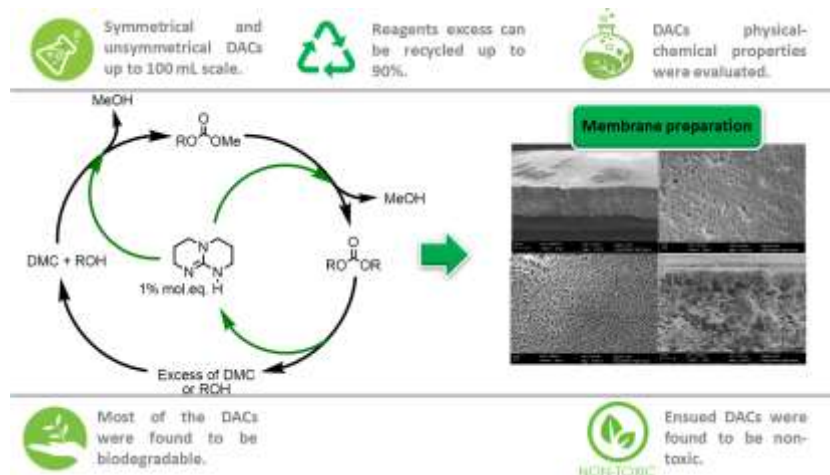


Figure 22 – DACs synthesis and application as green solvents for membrane preparation.

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