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Sustainable chemistry without borders: Highlights from an inaugural conference held at St Andrews in June 2025

Amit Kumar * and David J. Cole-Hamilton *

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This report provides a brief synopsis of the inaugural International Conference on Sustainable Chemistry for Net Zero (ICSC-NZ), held at the University of St Andrews in June 2025.

Let us organise a new conference! The very thought can feel more daunting than exciting, especially given the number of established conferences that have been running for decades. These long-standing meetings already have dedicated communities of attendees, as well as financial reserves from past events to help cover initial costs until registration fees and sponsorship income arrive.

So, why did we decide to launch a brand-new conference—the *International Conference on Sustainable Chemistry for Net Zero (ICSC-NZ)*—from scratch? The inaugural event was held at the University of St Andrews (Scotland) from June 10–13, 2025.

Most existing conferences are either highly specialised, attracting a relatively small audience or extremely broad, spanning nearly all of chemistry with very large audiences. We felt there was a need for a conference that struck the right balance: broad enough to encompass the many facets of sustainable chemistry, but focused on the urgent theme of net zero. Addressing the societal challenges of sustainability requires multiple areas of expertise and multidisciplinary collaboration, and a conference of this nature can provide the right platform for fostering new collaborations across different but related areas of sustainable chemistry.

The conference programme reflected this vision and was attended by 192 participants from 6 continents. It featured 8 plenary lectures, 18 session plenaries, 24 oral talks, 28 flash

presentations, and 40 posters, with contributions from academia and industry on topics including:

1. *Green synthesis and catalysis* involving small molecules and polymers, particularly from bio-derived feedstocks or CO₂.
2. *Molecules, materials, and concepts for energy storage*, especially batteries.
3. *Circular economy and waste recycling*, including CO₂ capture, chemical recycling of plastics, and the recovery of phosphorus and rare earth elements.

Highlights from the plenary lectures included:

- *Prof. David Milstein* (Weizmann Institute of Science, Israel): bond activation *via* metal–ligand cooperation and applications in green homogeneous catalysis and liquid organic hydrogen carriers.

EaStCHEM, School of Chemistry, University of St Andrews, North Haugh, St Andrews, KY16 9ST, UK.
E-mail: ak336@st-andrews.ac.uk; djc@st-andrews.ac.uk



Amit Kumar



David Cole-Hamilton



- *Prof. Buxing Han* (Chinese Academy of Sciences): heterogeneous catalysis for CO₂ and biomass valorisation, and depolymerisation of plastics.

- *Prof. Dame Clare Grey* (University of Cambridge, UK): advancing energy storage through solid-state NMR spectroscopy.

- *Prof. Regina Palkovits* (RWTH Aachen, Germany): heterogeneous catalysis for biomass utilisation.

- *Prof. Walter Leitner* (Max Planck Institute for Chemical Energy Conversion, Germany): multiphase catalysis, continuous flow processes for CO₂ utilisation, and organometallic catalysis for syngas production from methanol.

- *Prof. George Shimizu* (University of Calgary, Canada): scalable synthesis of metal-organic frameworks for environmental applications, including CO₂ capture.

- *Prof. Francesca Kerton* (Memorial University of Newfoundland, Canada): polymers and polymer feedstocks from biomass.

- *Prof. Sir Peter Bruce* (University of Oxford, UK): lithium-air batteries and crystalline polymer electrolytes.

Similar to the plenary lectures, other presentations were from diverse research topics, but connected under the umbrella of sustainable chemistry for net zero. The conference also featured three session

plenary lectures from industry. *Dr Christian Krueger* from *BASF* discussed industry challenges, and success stories, in achieving circularity and net zero from the perspective of manufacturing chemicals and polymers. *Dr Benjamin Kuehne* from *Merck* mentioned such challenges for life science and pharmaceutical industry and emphasized the need to compare processes by appropriate quantification and estimation in particular through life cycle assessment. *Dr Thoa Thi Minh Nguyen* from *Halder Topsoe* spoke about electrocatalysis for CO₂ transformation and ammonia production.

Beyond the lectures, the conference fostered community building through networking events, including a welcome reception, whisky tasting, gala dinner, and a traditional Scottish Ceilidh. Early-career researchers were especially active, with strong participation from PhD students and postdoctoral fellows. Prizes were awarded for 12 posters, 10 flash talks, and 2 oral presentations, sponsored by partner organisations.

The programme also included skill-building workshops: one discussed the why, the how, the when and the where of patent writing (by *Marks & Clerk*). The other workshop was held on policy engagement (by a *UKRI*-funded Network on Sustainable Chemistry for Net Zero),

where panellists from academia and industry discussed practical pathways and challenges in contributing to policy development. Multiple speakers also mentioned the *Stockholm Declaration on Chemistry for the Future* and urged participants to sign it. The declaration is a worldwide pledge to make chemistry safer, more sustainable, and better for people and the planet.¹ If you haven't done it already, you can read and sign the declaration here – <https://www.stockholm-declaration.org/>.

Overall, the conference successfully brought together a diverse, multidisciplinary community rarely convened under the same roof at long-standing meetings. We hope it not only raised awareness of the breadth of sustainable chemistry research but also helped spark new collaborations to tackle some of the defining challenges of our time. The future plan is to host this conference on a biennial basis with the next one being planned for September 2027 at the Institute of Carboquímica (ICB-CSIC) in Zaragoza (Spain).

References

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