

The first year of *Nature Synthesis*

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As the journal celebrates its inaugural volume, we reflect on one year of content with highlights from 2022 and aspirations for the future.

At the outset, we envisaged that *Nature Synthesis* would publish articles on two main themes – target-oriented synthesis and method-oriented synthesis. The former, target-driven articles, report a final product of interest either for practical reasons, or to establish unknowns of the product’s chemical and physical properties to further our understanding. For method-oriented articles, the journey of making the molecule or material signifies the advance compared with the state-of-the-art. Now, looking back through [Volume 1](#), we recognize research articles on these themes, as well as an interweaving of both. Many examples spring to mind but here, we highlight a few.

Hu et al. reported the formation of γ -graphyne, which comprises an equal portion of sp - and sp^2 -hybridized carbon atoms¹. A challenging allotrope of carbon to synthesize, γ -graphyne was made using reversible dynamic alkyne metathesis and by controlling the balance between kinetic and thermodynamic factors. Featured on the cover of this Issue, Wu et al. reported contra-helical iron(II)-templated trefoil knots, which are synthesized by coaxially nesting a small multistranded helix within a larger reverse helix. These trefoil knots show topomechanically tuneable spin-crossover properties in the iron(II) centres. In both cases, the syntheses of these targets are impressive and, although these advances are at the forefront of the articles, the route to making them and the properties identified are also key.

On a method-oriented theme, Mateos et al. investigated the mechanism of light-driven [2 + 2] heterocycloadditions (Paternò–Büchi reactions) between indoles and ketones and used the knowledge gained about key intermediates to control the stereoselectivity of the reactions. As a result, diastereoisomers that were previously inaccessible could be prepared. In materials chemistry, Zhang et al. described a flux-assisted growth method for atomically thin materials (ATMs) including metal chalcogenides, oxides and oxyhalides².



Nature Synthesis turns one.

Preparing high-quality ATMs can be difficult; however, using this route, a flux-crystallization mechanism enables precise control of their stoichiometry, and the confined reaction space guarantees the formation of ATMs. In the area of total synthesis, Ungarean et al. reported the development of a catalytic enantioselective hydroamination of benzene³. The chemical synthesis of aminoglycoside antibiotics is typically lengthy; however, this methodology enables the total synthesis of aminoglycoside (+)-ribosamycin in ten linear steps from benzene.

To celebrate our first anniversary, the editors of *Nature Synthesis* have curated a [Collection](#) of content published so far, in which we showcase the scientific areas and the variety of article types that typically feature in the journal.

We include in our [Collection](#) the Comment article by K. Barry Sharpless⁴, one of the laureates of the 2022 Nobel Prize in Chemistry. Entitled “Click chemistry connections for functional discovery” and co-authored by M. G. Finn and Hartmuth C. Kolb, the Comment explains how click chemistry involves the reaction of two molecules in a manner akin to “the satisfaction of easily connecting two objects with the snap of a push buckle”. A [sketch](#) from the lab notebook of Sharpless is featured – with molecules, drawn in ink, that have become emblematic of click chemistry over the past two decades. The simple and efficient nature of click reactions swiftly made them popular for the synthesis of small well-defined molecules, as well as extended materials, and it is not surprising that the Nobel committee recognized click chemistry this year. We congratulate all three laureates – Carolyn R. Bertozzi, Morten Meldal and K. Barry Sharpless – on their notable achievements.

The discovery of synthetic routes and the improvement of known methods are now benefiting from innovations in automation and

machine learning. In several articles, these technology-enabled syntheses are described – including, but not limited to, a computer-driven strategy enabling the systematic discovery and evaluation of iterative sequences of organic reactions reported by Molga et al.⁵, and an automated carbohydrate synthesizer capable of preparing a library of bioactive oligosaccharides by Yao et al.⁶. This automated synthesizer rapidly assembles carbohydrates up to 1,080-mer in size, starting from monosaccharide building blocks.

In addition, the importance of sustainable methods – to synthesize molecules and materials, as well as degrade and recycle them – has featured in the articles published this year. Kim et al. reported a biocatalytic photoelectrochemical approach to use non-recyclable microplastics as electron feedstocks that are broken down to produce value-added oxidation products, while at the same time, accelerating redox biosynthetic reactions⁷. Thus, the approach combines environmental remediation and the sustainable synthesis of chemicals from solar energy.

A central aim of *Nature Synthesis* was to provide a venue for reporting the best synthetic papers in chemistry and materials science and, perusing [Volume 1](#), these disciplines – that already come together in research laboratories – are brought together in the issues we have published. In achieving this, we thank our authors and referees for supporting *Nature Synthesis* by either choosing to publish with us or for peer-reviewing manuscripts with the rigour and constructive opinion that we require.

Looking forward to [Volume 2](#), in addition to the breadth of topics seen in [Volume 1](#), we are planning to highlight topics such as ammonia synthesis, automation in synthetic laboratories and hydrogen atom transfer for $C(sp^3)$ -H functionalization – watch this space!

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