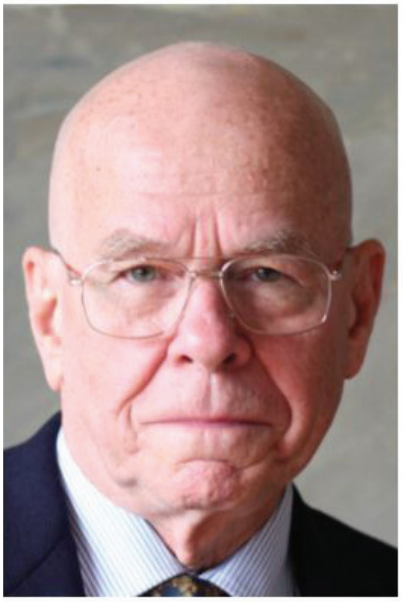
THE NOBEL PRIZE IN CHEMISTRY 2022

Carolyn R. Bertozzi
Born: 10 October 1966, Boston, USA. Affiliation at the time of the award: Stanford University, Stanford, CA, USA, Howard Hughes Medical Institute, USA

Morten Meldal
Born: 1954, Denmark. Affiliation at the time of the award: University of Copenhagen, Copenhagen, Denmark



K. Barry Sharpless
Born: 28 April 1941, Philadelphia, PA, USA. Affiliation at the time of the award: Scripps Research, La Jolla, CA, USA

The Nobel Prize in Chemistry 2022 was awarded jointly to **Carolyn R. Bertozzi**, **Morten Meldal** and **K. Barry Sharpless** "*for the development of click chemistry and bioorthogonal chemistry*".

The Nobel Prize in Chemistry 2022 is about making difficult processes easier. Barry Sharpless – who is now being awarded his second Nobel Prize in Chemistry – started the ball rolling. Around the year 2000, he coined the concept of click chemistry, where reactions occur quickly and unwanted by-products are avoided. Shortly afterwards, Morten Meldal and Barry Sharpless – independently of each other – presented what is now the crown jewel of click chemistry: the copper catalysed azide-alkyne cycloaddition (CuAAC). This is an elegant and efficient chemical reaction that is now in widespread use. The immense success of the reaction rapidly triggered the interest in using this transformation in biological systems. However, the toxicity of copper ions to cells and living organisms was found to limit the use of click chemistry for such applications. Therefore, the identification of conditions that avoided copper became an immediate challenge. In 2004, Carolyn R. Bertozzi used the feature of cycloalkynes, especially the highly strained cyclooctynes, 22 as a solution to replace CuAAC in biological systems, designing a copperless way of using click chemistry. Thus, Bertozzi built on the foundations of Sharpless and Meldal's work and took click chemistry to a new dimension and started utilizing it in living organisms. To map important but elusive biomolecules on the surface of cells – glycans – she developed click reactions that work inside living organisms. Her bioorthogonal reactions take place without disrupting the normal chemistry of the cell.

These reactions are now used globally to explore cells and track biological processes. Using bioorthogonal reactions, researchers have improved the targeting of cancer pharmaceuticals, which are now being tested in clinical trials.

Click chemistry and bioorthogonal reactions have taken chemistry into the era of functionalism. This is bringing the greatest benefit to humankind.

https://www.nobelprize.org/prizes/chemistry/2022/