‘Tour de force’ discoveries by Chinese chemists could overturn high cost of drug treatments

South China Morning Post, Nov 10, 2025

A research team’s straightforward alternative to expensive, complex and dangerous production methods is being hailed as a ‘Nobel Prize level achievement

Scientists in China have solved a 140-year-old chemistry problem in a breakthrough that could overturn traditional production methods and slash the cost of cancer treatments and other expensive medicinal compounds.

The research was co-led by Zhang Xiaheng from the Chinese Academy of Sciences’ Hangzhou Institute for Advanced Study and Xue Xiaosong, a professor with the Shanghai Institute of Organic Chemistry. The paper was published in the peer-reviewed journal *Nature*.

In his review of the paper, Scott Bagley, a senior principal scientist at Pfizer, described it as a “tour de force”, while some within China’s chemical research community are rating the team’s feat as “Nobel Prize level”.

The researchers proposed a straightforward alternative to the expensive, complex and dangerous method used by the chemical industry for more than a century to synthesise drugs and pesticides from a class of organic compounds called amines. According to the paper, the team’s approach overcomes the many issues that have plagued the classical method, including the risk of explosions, and it holds promise for making the production of important chemicals safer and more affordable.

“Overall, the authors have delivered a true tour de force here, not just developing the method but doing extensive scope, in-depth mechanistic studies and synthetic applications that clearly demonstrate the capabilities of this chemistry to be useful in many contexts,” Bagley said.

Corresponding author Zhang said in an interview with *Chemical & Engineering News* that he thought the chemical industry would “really, really benefit” from the chemistry detailed in the paper.

Traditionally, chemists have relied on diazonium salts as intermediates to transform inexpensive aromatic amines into highly valuable raw materials in a process called the Sandmeyer reaction. By leveraging their high reactivity, the chemical industry has been able to use these organic compounds as building blocks for the complex molecules that are indispensable in fields ranging from pesticides and pharmaceuticals to dyes and textiles.

However, this standard method – proposed in 1884 by the Swiss chemist Traugott Sandmeyer – has a notorious downside. It poses significant safety risks because of the explosive and unstable nature of the salts.

According to the local bureau of science and technology in the eastern city of Hangzhou, Zhang's team spent three years exploring direct transformation pathways for aromatic amines. Their innovative solution uses nitro groups instead of diazoniums, and it does not require an expensive metal catalyst or multiple steps, the local bureau said in an article about the breakthrough.

The core advantage of the research team's "one-pot" strategy lies in its remarkable versatility, achieved using only simple, readily available reagents. The researchers tested more than 170 chemical raw materials, including structurally complex drug molecules such as antiviral treatments. The new method efficiently converted the raw materials into the desired products, with success rates ranging from 46 to 83 per cent, the researchers reported. Traditional methods were largely ineffective in such cases, they say.

The team also conducted a kilogram scale trial to show the new approach's potential in a real-world setting. These tests achieved a success rate of up to 90 per cent, according to the study.

Zhang and his colleagues have reportedly begun working with local pharmaceutical and chemical companies to explore how the breakthrough could help to address their industrial needs.

Meanwhile, on Chinese social media, the team's achievement is being hailed by some commenters from the chemical research community as worthy of a Nobel Prize. Life Sciences Frontier, a specialist social media account, said that production costs were expected to decrease significantly once the technology was incorporated into the manufacturing processes of generic, hi-tech anti-cancer drugs, making them "more affordable for the masses".