https://doi.org/10.1038/s41565-022-01304-z

Telling nanotech success stories

Check for updates

At *Nature Nanotechnology*, we want to bring stories of real-world impact of nanoscience research to the attention of the whole community.

It's exciting when one's research takes off and becomes a viable technology. It is sad that when this happens, our readers remain in the dark. As a journal craving to cater for the entire, interdisciplinary nanotechnology community, we believe our readers should feed from each other's success stories.

This is why, as an experiment, in this issue we are publishing five short pieces that we have labelled *After Publication stories*. The idea is to highlight our authors and their past research. For the sake of this experiment, we simply chose papers in various areas published a few years ago that were highly cited, trying to understand why a particular paper did so well.

If the nanotech community likes these mini-stories, we would like this small space to morph into a showcase of real-world impactful research snippets. We believe that impact should not just be measured by number of citations, especially when it comes to applied research[1]. There are a number of ways where academic research can be impactful: from the point of view of the general public, one criterion has to do with improving lives and soothing suffering. Nanotechnology is not at a hype anymore; it's already making real-world impact[2]. And although it takes time — a lot of time — for a technology to reach commercialization, whenever this happens, the whole nanotech community should rejoice and take inspiration.

We seek stories that bring the hard work done in labs (both in academia and in the industry) to external fruition, be it leading to viable mass-produced devices, solutions for professionals/businesses, or making a real difference towards a United Nation's societal development goal (SDG). Especially exciting, we think, are stories of collaborations with local communities where a nanotech-based solution improves people's lives in a tangible way.

For instance, in the field of energy storage, we learn that after reporting a laboratory-scale high-performing lithium metal battery prototype, researchers at the Pacific Northwest National Laboratory are looking into making their design scalable (*Nat. Nanothechnol.* https://doi.org/10.1038/s41565-022-01300-3; 2022). A similar scale-up challenge is being undertaken by researchers at the ETH, Zurich, following their early mechanistic observation of a C–C coupling reaction for the synthesis of high added-value chemicals from co-feeding with a CO/CO_2 mixture (*Nat. Nanothechnol.* https://doi.org/10.1038/s41565-022-01303-0; 2022). In both cases, the fundamental observations we published were informed by technological needs: to develop high-energy density batteries moving beyond lithium-ion; and the fact that in real-life it is extremely rare to work with pure feeds for CO_2 electroreduction processes.

Meanwhile, researchers at the start-up ReCode Therapeutics are performing preclinical trials of lipid nanoparticles for targeted gene delivery to the lungs for the treatment of primary ciliary dyskinesia, a debilitating genetic disease. This development follows up from a paper by researchers at the Texas Southwestern Medical Center in which they reported a methodology dubbed SORT, a short for Selective ORgan Targeting, to extend lipid nanoparticle targeting organs other than liver (*Nat. Nanothechnol.* https://doi.org/10.1038/s41565-022-01292-0; 2022).

Non-volatile memory devices, found in USB drives, flash card and solid-state drives are reliable and sturdy, but their programming speed is too slow for miniaturized on-chip applications, where volatile SRAM and DRAM are currently used. Realizing long retention times, typical of non-volatile memories, and ultrafast read/write speeds in one device, had been until recently seen as mutually exclusive requirements. In two back-to-back publications, groups based at Fudan and Beijing University showed that a device architecture featuring multilayer 2D materials with atomically sharp tunnelling junctions can achieve the programming speed of DRAM memories. Efforts have now turned into making fully-fledged integrated non-volatile memory devices on-chip (*Nat. Nanothechnol.* https://doi.org/10.1038/s41565-022-01299-7; 2022).

In another example of impactful nanotech research, scientists at the University of Basel are now working at improving the end-to-end efficiency of quantum dot single-photon sources to surpass the threshold of fault-tolerant quantum states, which could lead to scalable photonic quantum computation (*Nat. Nanothechnol.* https://doi.org/10.1038/s41565-022-01295-x; 2022). They got tantalizingly close in a paper we published in 2021.

Whether it is quantum computing, memory devices, batteries, catalysis, or nanomedicine, the huge investment of public and private money in nanoscience and nanotechnology will inevitably result in technological breakthroughs that are going to impact our lives. We are thrilled when we have the privilege to publish the initial idea in the form of an academic paper, but we would be also thrilled to keep in touch, years down the line, to learn how fundamental discoveries or lab-scale devices are making an in-road into commercial products, translation into the clinic, tackling SDG-related challenges, or improving lives of local communities.

Published online: 8 December 2022

References

1. *Nat. Nanotechnol.* **13**, 525 (2018).
2. Nanoscience and nanotechnology. *Nature* https://www.nature.com/collections/fhheahdgaa (2022).