

Why I wrote a children's book about nanoscience

As a schoolgirl, **Jess Wade** had no idea that jobs like hers existed, so she teamed up with illustrator **Melissa Castrillón** to spread the word and tackle misconceptions about nanoscience.

Innovations enabled by nanoscience can transform lives, helping to provide clean drinking water and more sustainable public transport, and driving advances in health and medical research. But the successful translation of nanoscience from the lab to the real world requires a society that trusts, accepts and appreciates our discoveries. 'Nano-phobia', which describes fear and nervousness associated with the super small, is a genuine phenomenon, and some of the far-fetched early predictions for nanotechnology didn't help to strengthen public support.

'Nanobots', for instance, have potential applications in targeted drug delivery and environmental clean-up. When they were announced in the early 2000s, media coverage compared their replication mechanisms to viruses. Predictions that they could take over human thought and destroy the world stoked unnecessary fear.

The mRNA COVID-19 vaccine is another example that shows how much work we have to do. The vaccine delivers mRNA via lipid nanoparticles, which tells the immune system to produce antibodies to fight COVID-19. The nano-size of the liposomes allows them to efficiently travel to specific locations within cells, where they transfer the mRNA that instructs cells to produce the proteins that trigger the immune response. The liposomes harmlessly degrade once their job is done.

The COVID-19 pandemic was the first time such nanoparticle vaccine technology was manufactured on a global scale, and efforts to educate the public on its safety and efficacy fell behind as governments raced to vaccinate populations. Misleading health information spread online, and an unjustified fear of the very small contributed to



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widespread vaccine hesitancy, which probably translated to hundreds of thousands of preventable deaths.

Effective education campaigns require a multi-disciplinary network of communicators with diverse perspectives to teach people about the benefits of nanotechnology. They can also help in raising awareness of genuine environmental and health-related concerns, such as the toxicity of nanoparticles that leach into the environment, to ensure that work to address them is publicized and funded.

Public engagement isn't just about addressing misinformation. As scientists, much of our research is taxpayer funded: we have a moral responsibility to communicate the outputs of our discoveries to the people who pay our salaries. We also have a responsibility to inspire and motivate future generations of nanoscientists, who are hopefully more diverse than the generations who have come before.

At Imperial College London, my work is focused on the nanostructures of chiral semiconductors and how these nanostructures impact their electronic and photophysical properties. I'm based in the London Centre for Nanotechnology, one of the largest, most interdisciplinary and most collaborative nanotechnology centres in the world. When I was at school, I had no idea that jobs like mine even existed. Now I want everyone to see how exciting and rewarding a career in nanoscience can be.

I've taken many approaches to science communication, including science festivals, podcasts, school workshops and poetry slams. I've written pages on nanoscience-related topics for Wikipedia and, most recently, set out to explain nanoscience in a children's picture book. With award-winning illustrator Melissa Castrillón, I wrote *Nano: The Spectacular Science of the Very (Very) Small* (published by Walker in February). *Nano* is Mel's first non-fiction book, and she almost didn't take it, having been warned by her illustrator friends that nanoscience would be a very boring subject.

My editors had to work hard to convince me that not every six-year-old wants to know as much about Raman spectroscopy as I do – but watching as Mel deciphered the beauty of nanoscale patterns and visualized the chaotic and wonderful atmosphere of a lab has been thrilling. It's like discovering how incredible nanoscience is all over again.

We've since run online and in-person interactive nano workshops for children, training very, very early career researchers in how to draw elaborate crystal structures and carbon allotropes, while talking them through structure–property relationships. Children read these books in libraries, classrooms and at home, sharing what they learn with teachers and parents. Updating school and university curricula to cover discoveries and applications of nanoscience can help to inspire the scientific leaders of tomorrow. With nuanced discussions around the risks and rewards of super-small science and new ways to teach the next generation, we'll improve public trust, understanding and enthusiasm.