



“Art can translate certain concepts of science that are often difficult to understand, into an experience.”

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# THE STUDY OF LIGHT

Despite most of his work occurring on a nanoscale level, or one billionth the size of a metre, Dr. Shawn Tan has always been drawn to the bigger picture.

The scientist from the Institute of Materials Research and Engineering (IMRE) deals with the nascent field of science called nanoplasmonics, which studies and manipulates how light interacts with metal particles at the nanometre scale. Metals at the nanoscale demonstrate electronic and optical properties that differ from their bulk counterparts, and their optical response can be engineered by the particle size and relative positioning to manifest different colours.

Although small in size, Shawn’s innovation may serve as a springboard for massive advancements in technology.



Full colour reproduction of Monet’s *Impression, Sunrise* using aluminium plasmonic pixels

## IMITATING MONET

Using nanoplasmonics, Shawn managed to create the world’s smallest reproduction of a painting, and in full colour. Referencing Claude Monet’s *Impression, Sunrise*; the dappled brushstrokes of the Impressionist painting were reproduced on a canvas of a mere 300 micrometres across. “A spectrum of colours can be achieved by engineering the size and position of metal nanostructures, which influence how they interact with light,” Shawn explains.

With this approach, an impossibly high resolution of approximately 100,000 dots per inch (dpi) for printed colour images can be achieved, far surpassing available industrial printing techniques. For this innovation, Shawn has been shortlisted as one of the top 10 innovators in MIT Technology Review’s Innovators Under 35 list from the Asia-Pacific region.

## SERENDIPITY AND NANOPLASMONICS

Shawn describes his initial foray into the field of nanoplasmonics as “tangential”. During his studies here and in the US as an A\*STAR scholar, he navigated towards subjects like cancer therapy, DNA assembly of metal nanoparticles, and then finally found his niche with nanoplasmonics.

Always keeping up with the latest developments in science and technology, Shawn has his sights set on nanoplasmonics and other fields beyond. “Science is a good path to learn and discover, but there are other avenues to learn from and apply as well,” he says. He has taken courses in areas as diverse as data science, financial accounting and business analytics, and is confident these skills can be applied and complement what he has already learned at A\*STAR.

Aside from producing colour images, nanoplasmonics could be employed in areas of authentication and security, like to make tags that cannot be easily replicated to protect high-value genuine goods and even currency. “The next step will definitely be on trying to reduce costs while improving the scalability so that it can be easily adopted by the industry,” he says.

Another interesting application that he hopes to dabble in is jewellery, as the technology could impart colours to the metals used, or to print micro-sized photos on jewellery, as personalised mementos.

## ART, APPLIED

Shawn’s interest in translating his innovation into more creative outlets stems from his love of art, especially local contemporary and performance art. “I have always valued exposure to new experiences and new skills,” he says. In the age of multi-disciplinary work, Shawn believes that lessons learned from artists dabbling in many different mediums can be applied to science as well. “Every year, artists are renewing themselves; they are exploring and integrating new things into their work,” he observes. “Even as a scientist, you really need to know what’s out there to do well in your work.”

## A MELTING POT OF EXPERIENCES

In his free time, Shawn enjoys expanding his horizons by reading up on subjects like business and psychology, travelling, and cooking. On the topic of what inspires him in life, Shawn takes a bird’s eye view on things: “My inspiration rarely stems from a single source but rather a melting pot of experiences. For example, if you’re going to make a decision, you make an informed decision based on the breadth of information and experiences you can source out, or have been exposed to before.”

Shawn’s freeform, cross-disciplinary approach is evident outside his work. Even when talking about his hobbies, he cannot resist drawing comparisons back to science: “The kitchen is kind of a lab; cooking is both an art and a science, no?”

