Healing skin with biomaterials

Moving research into the commercial world is not without its challenges, but it has been an exciting step for the University of Auckland's Professor Juliet Gerrard and her team. Her company, Hi-Aspect, was formed in order to commercialise a protein-based nanomaterial for use in skincare products and wound dressings.

The early days

It was a blue-sky research project, which led Professor Gerrard to her discovery of this material. While working at the University of Canterbury, and collaborating with Plant and Food Research, she began to explore how proteins assemble in the body – a fundamental biochemistry question. But the research team soon took their work further. "Rather than just understanding the structure that biology had given us, we wanted to change it, and see what we could do with it," Professor Gerrard said.

The structure they came up with is visually very similar to another superstar material – carbon nanotubes. But unlike carbon, these protein nanofibrils were found to form a soft, stable gel in water, which proved to be stronger than collagen. They're also stretchy, incredibly hard to break, and form a scaffold for other molecules, such as vitamins or healing ingredients, to stick to.

From a new generation of dressings that help wounds heal faster, to a moisturiser that actually delivers what it says on the label. All made using New Zealand science.

Spinning-out

Through the Institute, Professor Gerrard began to meet MacDiarmid researchers from other disciplines who were developing various nanotech devices – "Before that I was a biochemist working just on biological problems. Now I was looking at it from a new viewpoint." The big step, then, came with the realisation that their material could be produced not just from ultrapure lab ingredients, but with low-cost ingredients. They were ready to emerge from the lab.

Fundamental science may have driven the research, but Professor Gerrard was already aware of the potential impact that their results could have on the wider world. "New Zealand is very much a biological economy, and we felt confident that our work could add real value to that sector," she said. Others agreed, and with the support of Callaghan Innovation and Powerhouse Ventures Ltd, she set up Hi-Aspect in 2015.

Commercial future

The protein nanofibrils form the foundation of Hi-Aspect's work, and they are being made into gels, films and patches for use in wound dressings and skincare formulations. "The scale up has gone so well, we have kilograms of the stuff!" said Professor Gerrard, so it's perhaps unsurprising that they're now in discussion with organisations all over the world to develop the materials further.

Fundamentally, what Professor Gerrard and her team are doing is using otherwise wasted or low-value biological materials to produce high-value goods for export. But for the everyday consumer, Hi-Aspect's nanofibres could find their way into their daily lives – from a new generation of dressings that help wounds heal faster, to a moisturiser that actually delivers what it says on the label. All made using New Zealand science.