SUSTAINABILITY: PARX PLASTICS

A start-up company based in the Netherlands and Italy has developed a technique to use zinc as a means of adding antibacterial functionality to any polymer. It has high hopes of sparking interest among sports apparel manufacturers.

Star start-up to make 'antibacterial' easier

Parx Plastics, a Dutch-Italian start-up specialising in antibacterial plastic technology, has been named by the European Commission as one of the top three technology start-ups in Europe in a new competition called Tech All Stars. Commission vice-president Neelie Kroes, whose remit is to promote the digital economy in Europe, introduced the Tech All Stars competition this year to encourage backing for young European start-ups and to help create the jobs.

It was Parx Plastics' work with innovative biocompatible technology to make antibacterial plastics that impressed the judges. Chief executive, Michael van der Jagt, explains that, after filling out an application form, he received a call from the competition organisers, answered some detailed questions and learned a few days later that his company was among 12 invited to take part in the final. This involved an all-expenses-paid trip to London for training, roundtable sessions and the chance to pitch to a special jury of venture capitalist firms at the end. They picked the best three pitches and included Parx Plastics among the winners, entitling it to €20,000 in Google credits.

Parx Plastics is based in Rotterdam and has its research facilities in Bologna. It took four years of work to bring its ideas and research to fruition. A team of 11 professors, scientists and researchers with decades of experience in the fields of nanotechnology, biotechnology and chemical analysis, have been working together with a renowned European university on this. The result is its new, worldwide patent-pending treatment for plastics with an antibacterial effectiveness rate of 98%-99%, measured according to the ISO 22196 standard (specific to evaluating antibacterial activity). By applying biomimetics and nanotechnology, the company has developed a method of making "an intrinsic change to plastic



Parx Plastics chief executive, Michael van der Jagt, has his eye on a bright future for the start-up.

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resulting in a mechanical and physical property that acts against bacteria and microorganisms". The patented technology does not use chemicals, biocides, heavy metals or nano-particles. Instead, it makes use of one of the body's most abundant trace elements: zinc

"The technology is fully biocompatible, it is not toxic and it does not leach out of the materials and yet it will kill within 24 hours 99% of the bacteria and micro-organisms that are on the surface of a product," chief technology officer Michele Fiori says. "The technology is really what the market is desperately looking for since today's available solutions are becoming more and more restricted because of harmful effects on humans and the environment."

Doubts definitely exist. Towards the end of 2013, a Washington DC-based non-profit organisation, the Natural Resources Defense Council (NRDC), won a court case against the US Environmental Protection Agency (EPA) over the use of nanosilver in textiles. A ruling by the ninth US Circuit Court of Appeals said the EPA had improperly approved the use of nanosilver by a textile manufacturer and sent it back for re-evaluation. The EPA has still to publish the result of this re-evaluation. "The court's ruling puts us a step closer toward removing nanosilver from textiles," said Mae Wu, a lawyer in NRDC's health programme at the time of the ruling. "EPA shouldn't have approved nanosilver in the first place." Her reason for saying this is that the court said the EPA's own data suggests nanosilver is a "potential risk".

At Parx Plastics, Michael van der Jagt talks of "multiple scientific studies" that have explored the properties of zinc, including the metal's antibacterial effect and ways in which nature uses it to fight off bacteria (hence the reference to biomimetics). Zinc can help with anti-ageing treatments, and zinc deficiency has been linked to depression. "Zinc is very safe to use," he insists. "In fact, the body requires it; it helps build up our immune system, our muscle tissue and so on. Even so, what we have found is a way to incorporate zinc into polymers in a way that makes sure it will not leach out or migrate. It would be safe even if it did, but our treatment means it will not leach out." Naming no names, he draws a contrast with popular antibacterial treatments such as those employing nanosilver particles, effective, but which leach out. "Yes, it's on a nano scale, but those particles are toxic, and the use of this technology is increasing," he says. "If we use more and more of these particles, if they are in everybody's sports shirts and socks, it all contributes."

Parx Plastics' technology can be applied to any polymer, using nanotechnology to incorporate zinc into plastic, but using no nanoparticles. "It can be applied to roughly any synthetic fibre," Mr van der Jagt says. "For example fleece is made of polyethylene terephthalate (PET). We can apply the treatment to PET which is used to make the fleece, or to the polyester in football shirts."

He said the company is not yet talking to any manufacturers of sports or outdoor clothing, but said sports and outdoor represent "an interesting field of application, for sure". Talks have begun with companies interested in using Parx Plastics' treatment at yarn level, for applications in medical clothing, for example, as well as in consumer markets.

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