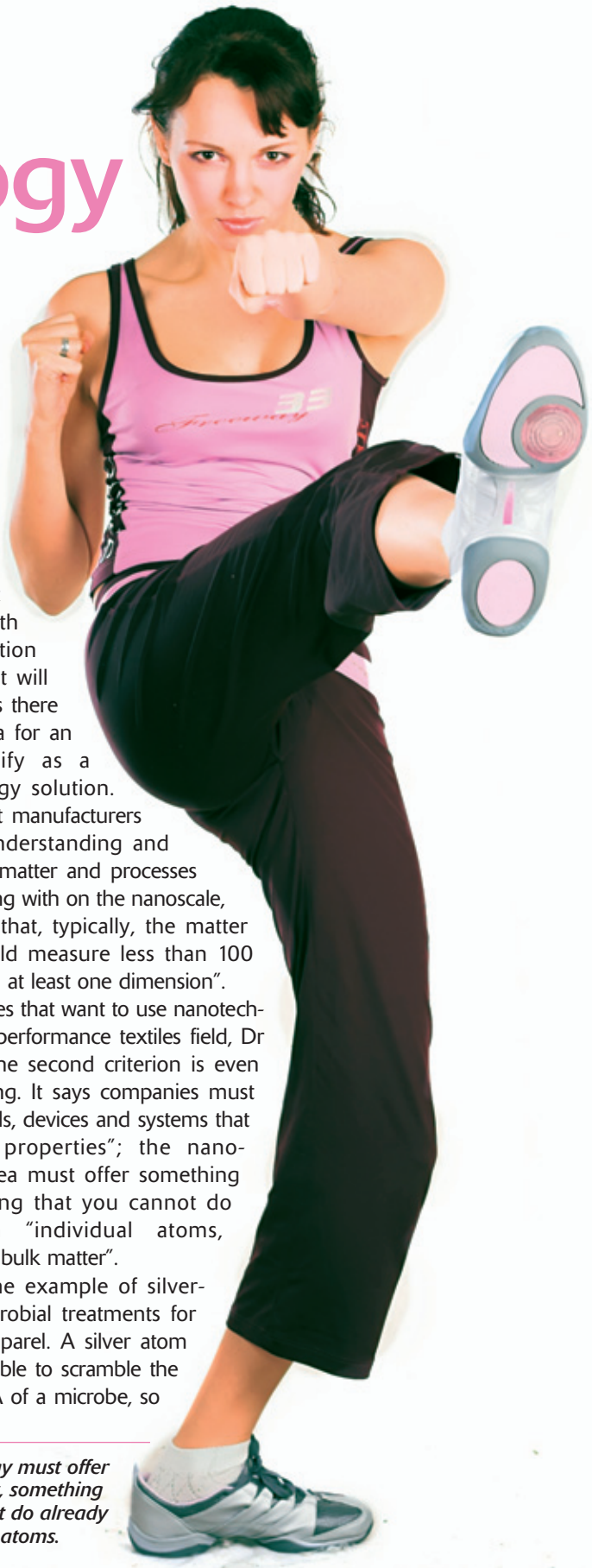
Confusion often reigns when marketing executives try to 're-interpret' information from the scientific community. Baxenden Chemicals business development manager, Dr Rob Lomax, has a foot in both camps and fears that nanotechnology is one of the latest ideas to suffer this fate.

Why real nanotechnology is all about control



Nanotechnology may not be new, but it's certainly 'now'. It's an inescapable buzz-phrase in today's textile industry, prominent in the marketing literature of manufacturers and suppliers of all sizes. It's so prominent that the whole idea behind 'nano' is in danger of becoming lost, and there is a chance that the buying public may even stop noticing it.

Not so Rob Lomax, business development manager for UK-based Baxenden Chemicals, seasoned textile professional and polymer chemist. He certainly notices the term when it appears on a press release or in advertising material, and is becoming annoyed by what he sees as potential mis-use of it.

"This is causing confusion," Dr Lomax says. "Just because something is nano-sized or works at a nano level, it doesn't necessarily mean that it's a product of nanotechnology. Some people are in danger of over-stepping the mark and it just becomes confusing for the public."

Standards to set

One reason for the lack of clarity is that the standards for nanotechnology are still being developed. Committees, such as CEN (the Central European Committee for Standardisation) Technical Committee 352, which is working on a nanotechnology standard, often meet no more often than twice a year, which means progress takes time.

"I have been on committees myself," says Dr Lomax, "and looking back on some of them, I'd say we talked for seven years about not very much. For Committee 352, I think one of the problems is that they are trying to come up with one standard that covers all—nanofibres, nanochips, everything. That's very difficult to do."

But he is grateful to the CEN committee for at least coming up with a good definition of the scope it will keep to. It says there are two criteria for an idea to qualify as a nanotechnology solution. The first is that manufacturers must show understanding and control of the matter and processes they are working with on the nanoscale, which means that, typically, the matter involved should measure less than 100 nanometres "in at least one dimension".

For companies that want to use nanotechnology in the performance textiles field, Dr Lomax feels the second criterion is even more interesting. It says companies must create "materials, devices and systems that exploit new properties"; the nanotechnology idea must offer something new, something that you cannot do already with "individual atoms, molecules and bulk matter".

He offers the example of silver-based, antimicrobial treatments for textiles and apparel. A silver atom on its own is able to scramble the DNA and RNA of a microbe, so

Nanotechnology must offer something new, something that you cannot do already with individual atoms.

it looks as though anyone applying the nanotechnology tag to an antimicrobial treatment of this kind could face standards trouble further down the line, regardless of how effectively their idea controls odour. "The solution may or may not work," Dr Lomax adds, "but that's not down to 'nano'."

Clear understanding

Textile chemists and other scientists will understand this clearly, he insists, and he says again that the problems occur when the scientific facts get into the wrong hands, those of the people who think up advertising campaigns. Just like earlier buzzwords such as 'microfibre' and 'microporous', and others we see so frequently today—'smart-fibre' or 'biomimetic', for example—the term 'nano' is one that companies are employing in the hope and expectation that it will help them sell more product.

"It helps you present your product as better and more up to date," Dr Lomax continues. "It can also help people in academia secure research funding. If you can stick a few 'nanos' and 'smarts' into your proposal, you stand a better chance of success. That's the way things are."

He accepts, however, that it's far from easy for buyers, brands, retailers and consumers to keep track of it all. The Baxenden director believes it is worth having the old phrase, 'caveat emptor' (buyer beware) in mind, and also showing a healthy level of caution in discussion with anyone trying to sell you a nanotechnology solution. Ask them to prove that it really is 'nano', he suggests.

Nothing new

He points out that textile chemists, of all people, must realise that there is really nothing new in controlling the build-up of the molecular structure of something to make it do what you want it to do. The proof is that synthetic fibre polymers such as polyester, nylon and polypropylene have been around now for at least 70 years.

"It goes back much further than that," he goes on. "The Romans and the Egyptians practiced what we might now call nanotechnology. All they lacked was the understanding and, therefore, the control of the processes." Understanding and control, it's worth saying again, are what underpin nanotechnology for CEN.

One of the most interesting examples is that, without realising it, the Romans used tiny particles of gold to colour glass red, an application that lived on for centuries, for example in stain-glass windows. The Romans and the medieval architects knew that they could turn the glass a different colour, but they had little control over the process or over the final tint they would achieve.



The Romans and the medieval architects turned glass a different colour using what we might call today nanotechnology.

There is one modern-day spin-off from this that does have a high level of control, and Dr Lomax likes it very much. It is the brainchild of Professor Jim Johnston from the school of chemical and physical sciences at Victoria University in Wellington, New Zealand. His aim is to combine chemical process technology with readily available raw materials to create new high-value products. In this case, the raw material is New Zealand Merino wool and the process is to apply natural pigments to it using nanoparticles of gold.

The gold particles are in colloidal dispersions and the professor is controlling their size in a very precise way, allowing him to produce a range of colours. Tantalisingly, Professor Johnston says he has recently made "a very significant breakthrough", which he is putting through the patenting process at the moment. We hope to cover this in a future issue of *WSA*. He says the strategic objective for him is always to identify specialist niche market opportunities arising from his ideas, and to work with external companies to make the most of them.

Rob Lomax points out that the likeliest niche market for an idea like this would be the high-fashion sector, and he believes it could work with other natural fibres, such as cotton, although it would be "less easy" with his own area of expertise, synthetics. "I think high-fashion is where it would work best because, with gold and Merino wool, it would combine the highest-quality materials," he adds. "It wouldn't be about cost. Yes, gold is expensive, but to achieve a permanent pigment in textiles, and to take advantage of its natural qualities, you really don't need very much of it."