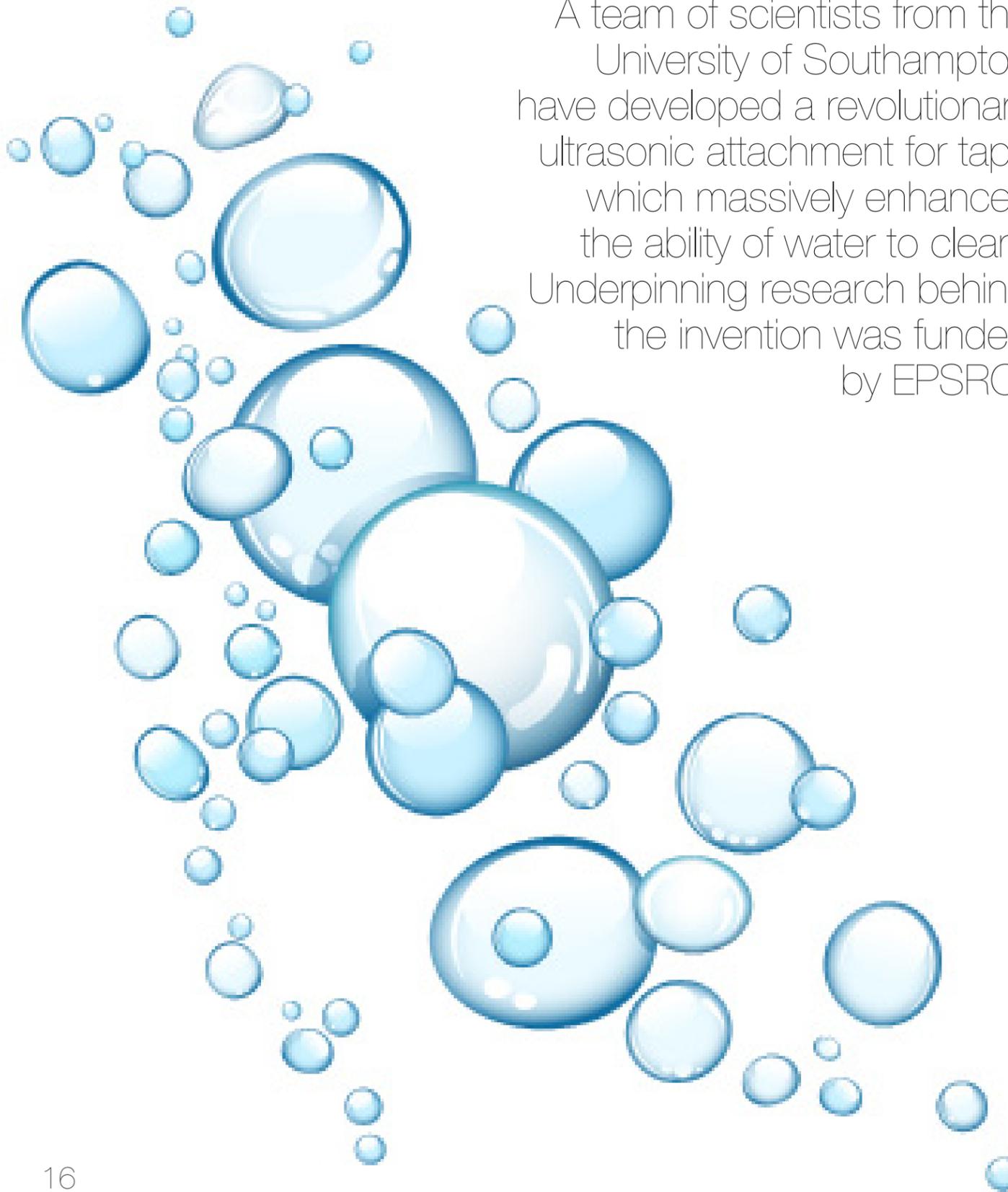


GOOD VIBRATIONS

A team of scientists from the University of Southampton have developed a revolutionary ultrasonic attachment for taps which massively enhances the ability of water to clean. Underpinning research behind the invention was funded by EPSRC.



In recognition of their invention, Professor Tim Leighton and Dr Peter Birkin were awarded the Royal Society Brian Mercer Award for Innovation 2011, and a cheque for £250,000 to further their research. The two scientists had previously collaborated on four EPSRC-funded projects involving ultrasonic surface effects and cavitation.

Currently, industry uses excessive water, power and additives for cleaning. For example, it can take up to 100 tonnes of water to produce one tonne of clean wool after shearing.

Many industrial processes also generate large quantities of contaminated run-off. The water from hosing down an abattoir represents a real health risk and cannot be allowed to enter the water supply. Purifying run-off is costly – each cubic metre of water used for cleaning in the nuclear industry can cost around £10,000 to subsequently treat.

COLD WATER CLEANING

Professor Leighton and Dr Birkin's device works with cold water, minimal additives and consumes as much electrical power as a light bulb. Its application will be wide – licenses have already been sold to a number of industries to look at cleaning in food preparation, hospitals, manufacturing and the home.

The new technology consumes less water and power than the established competitor technologies. Using the £250,000 Royal Society award, the team will develop products based on an ultrasonic nozzle which can fit on the end of a tap or hose.

The new nozzle generates both bubbles and ultrasound. Both travel down the water stream to the dirty surface, where the bubbles act as microscopic 'smart scrubbers'. The device also features a low power setting – suitable for foodstuffs or hand washing.

Licences to enable companies to bring the technology into their product lines have been negotiated with a number of companies to explore cleaning products for hospital hygiene, dentistry, food preparation, manufacturing and the power industries.

LEAN AND GREEN

Professor Leighton and Dr Birkin's device uses less water and power than the equivalent pressure washer. It is also far less damaging, as the stream pressure is less than 1/100th that of a pressure washer.

Another advantage is that it generates far less runoff and aerosol – tiny atmospheric particles of water that can carry contaminants into the air to then settle and contaminate other surfaces.

What's more, because the device is able to use cold water, energy is also saved on heating water.

Professor Leighton (pictured below left with Dr Birkin and the ultrasonic nozzle) says: "Society runs on its ability to clean. Ineffective cleaning leads to food poisoning; failure of manufactured products such as precision watches and microchips; and poor construction – from shipbuilding to space shuttles – since dirty surfaces do not bond.

"The impact in healthcare is huge – hospital-acquired infections, from instruments that aren't properly cleaned, cost the National Health Service £1 billion per year."

OBVIOUS NEED

Dr Birkin says: "There's a very obvious need for technologies that improve our ability to clean while saving on our most important resources, water and energy."

Power washing generates large volumes of contaminated run-off and aerosols. These present a hazard when used, for example, in cleaning sewage systems or nuclear contamination.

One of the main pieces of equipment currently used for industrial cleaning, an ultrasonic cleaning bath, can only clean objects small enough to fit inside it. The devices to be cleaned sit in a soup of contaminated liquid.

Neither power washing (high-power pressure washing) nor ultrasonic cleaning baths can easily be scaled-up and neither can be used on delicate materials such as hands or salad.

Dr Birkin says: "For us, the new funding we have received represents a significant

milestone for the development of this technology and its possible exploitation.

"As well as being timely, the award will significantly enhance the chances of this novel technology making the leap from the lab and into wider society."

Professor Leighton adds: "Support for step-changing innovation is vital if we are to have marketable technology to address the problems that will face society on the 10-50 year timescale, rather than just responding to today's problems.

"It is pleasing that a significant 'blue skies' research effort within our team, over the last 10-15 year time period, has led to an understanding of the basic physical and chemical processes that underpin this technology.

"It's been a dream project to build on fundamental research supported by EPSRC to reach industry-funded technology transfer.

"We're at a stage now, thanks to collaborations with the Defence Science and Technology Laboratory, and through Knowledge Transfer Secondments, where industry is commissioning us to plan future products."

“ Society runs on its ability to clean ”

