

Nanotechnology research could aid paper exports

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(PhysOrg.com) -- Researchers at Victoria University, New Zealand, have discovered ground-breaking new ways to capitalise on New Zealand's increasingly valuable paper export markets using nanotechnology.

Dr Aaron Small and supervisor Professor Jim Johnston investigated cost-effective methods of printing or coating nanoparticles onto paper and packaging materials. Nanoparticles are tiny particles 10,000 times thinner than the average human hair.

By adding a simple step to the end of the paper making process, their finding makes possible the development of new magnetic, electrically conductive or optically active specialist paper products.

While nanoparticles are already used to coat materials such as fabric or clay particles, this is the first time the technology has been used with a New Zealand-grown and produced material such as Kraft board fibers (*Pinus radiata*), which are exported as newsprint grade paper internationally.

Dr Small, whose PhD results were published in international scientific journals *Current Applied Physics* and the *Journal of Colloid and Interface Science*, says the methods have many potential uses.

"We know how to print nanoparticles that glow under Ultra Violet light but are invisible under normal light. They could be used for security labelling to protect against counterfeiting. You could also have a label

that might be blue within the use-by-date and when it's expired it would turn red," he says.

The results could also provide a cheaper alternative to some metals, such as copper. Copper is commonly used to shield equipment sensitive to electromagnetic radiation such as cellular and wireless network frequencies.

"For equipment that's sensitive to interference you could line the walls of a room with cardboard coated with nanomaterials to block out problematic frequencies. The same material is anti-static and could be used to package sensitive equipment such as computer components."

New Zealand exports more than \$600 million of paper products a year and new markets in higher value printing and packaging papers are expected to emerge within 10 years.

Dr Small says his PhD research aimed to use "clever chemistry" to increase the value of New Zealand's specialist paper products.

Over the course of his three-year doctorate, Dr Small worked in laboratories at Victoria University, Industrial Research Limited, the Australian Defence Science and Technology Organisation in Melbourne and the Forschungszentrum Karlsruhe, a government research institute in Germany.

He has established how to synthesize the nanoparticles and characterize their properties. Further research or a larger pilot project will be undertaken if financial support can be secured.

Provided by Victoria University

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