

Ideas on the Edge

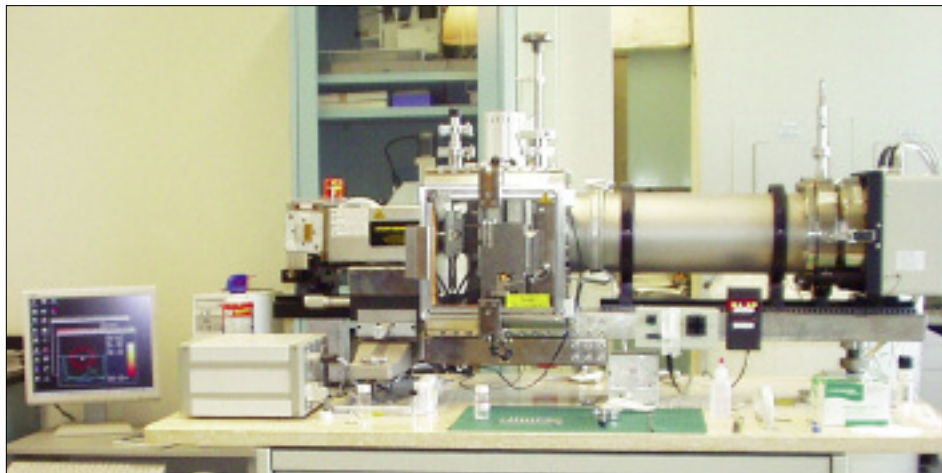
A (Very) Close Look at Paint

NANO-SCALE POLYMER RESEARCH AT THE UNIVERSITY OF TORONTO IS CREATING MORE ENVIRONMENTALLY-FRIENDLY WAYS TO COLOUR OUR WORLD.

“I used to give talks entitled, ‘Watching Paint Dry,’” laughs chemist Dr. Mitchell Winnik, of the University of Toronto. “But that was too exciting a description of my research. Now I tell people that I watch dry paint age.”

impacts on the coatings industry—impacts with both environmental and economic outcomes. One focus has been on finding alternatives to volatile organic compounds in paints. Organic solvents help paint dry at the right speed, but contribute to air pollution. A more detailed understanding of the drying process—thanks to Dr. Winnik’s painstaking science—has led to the development of new lines of environmentally-friendly paints that no longer need those solvents.

“OUR ROLE IS TO PROVIDE KNOWLEDGE THAT COMPANIES PREVIOUSLY THOUGHT THEY COULD NEVER ATTAIN.”



Bombarding polymer samples with beams from a small-angle X-ray scattering system provides researchers with molecular-level data—information that holds the key to materials-science breakthroughs like better coatings for plastic auto parts.

That’s a very modest way to describe the world-class research Dr. Winnik is conducting into the behaviour of polymer films at the molecular level at the University of Toronto’s Centre for Nanostructured Polymeric and Inorganic Materials. In fact, he’s a pioneer in applying the tools of nanotechnology to the study of coatings. The results have provided paint companies with their first real knowledge of what’s actually happening as their products are applied and as they dry.

The research is having revolutionary

His insights into polymer chemistry may also help car manufacturers find a solution to another long-standing

RESEARCH THAT MATTERS
REAL-WORLD BENEFITS FOR ONTARIANS:

- better and more environmentally-friendly paints and other coatings
- new medical tools for regeneration of bone and tissue
- new tools and materials for IT
- future jobs and prosperity, based on Ontario’s leadership in key manufacturing, medical and information technologies

problem: getting paint to stick to plastic. Instead of focusing solely on the paint itself, Dr. Winnik is using sophisticated imaging equipment to explore the complex interaction of coatings and the plastic itself in the one-micron thick layer where they meet. (A micron is one-millionth of a meter.) The research will help in the production of bumpers and other auto parts that hold their finish much longer, leading to fewer warranty claims and



Project: Centre for Nanostructured Polymeric and Inorganic Materials
Institution: University of Toronto
Research Discipline: Engineering/Materials Science and Technology
Principal Investigator: Mitchell Winnik
Trust Investment: \$4,317,332
CFI Investment: \$4,317,332
Total research investment from all sources: \$10,795,851

the Centre from the perspective that a lot of us with very different interests needed common facilities.” Other colleagues are using the same devices to pursue projects as diverse as high-density information storage in polymer films, and bone and nerve regeneration using special plastic scaffolds.

It’s all research that will help keep Ontario’s economy

therefore potentially saving money for manufacturers—and ultimately customers.

Another benefit of the new technology will be to make coated plastic parts easier to recycle—and therefore easier on the environment.

Dr. Winnik’s work involves looking at

structures as small as 50 nanometres. By

comparison, a human hair is 80,000 nanometres wide. Science at this scale depends on advanced imaging equipment provided in part by an investment from the Ontario Innovation Trust. The new tools are enabling a variety of research ventures at the Centre for Nanostructured Polymeric and Inorganic Materials, which Dr. Winnik heads. “We set up



competitive. “We’re knowledge-providers,” says Dr. Winnik of his research. “Our role is to provide knowledge that companies previously thought they could never attain. Then it’s up to them to use that knowledge to become better inventors.”

Whatever the application at the nano-scale—from new paints for the auto sector to new forms of bio-tech—the Centre is helping keep Ontario on the cutting edge at the macro-scale of the global marketplace.



University of Toronto

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Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario’s universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario’s position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.