

Industrial Research Assistance Program (IRAP)

**Region:
Ontario
St. Catharines**

Norgen Biotek Corporation



"IRAP was instrumental in making this technology a reality."
Dr. Yousef Haj-Ahmad, President and CEO, Norgen Biotek Corporation

Better tools smooth the way for the genomics revolution

In the mid-1990s, Yousef Haj-Ahmad and Dody Bautista were riding the crest of the genomics revolution, but they often felt like they were stuck on shore waiting for lab results. Bautista, a research associate and supervisor of Professor Haj-Ahmad's molecular biology lab at Brock University, was spending hours isolating and purifying DNA and RNA samples with traditional methods that were slow and awkward to use.

The entrepreneurially minded Dr. Haj-Ahmad could see that the genomics industry was growing and if these were the tools of the revolution, he bet there was room for improvement.

"I started Norgen Biotek Corp. in 1998 to create products that were going to be critical to genomics research in the future. We focused on making tools for isolating DNA and RNA that were user-friendly, rapid and inexpensive," says Dr. Haj-Ahmad, President, CEO and owner of St. Catharines, Ontario-based Norgen Biotek.

And with support from the National Research Council's Industrial Research Assistance Program (NRC-IRAP) Norgen has created a world-class nucleic acid and protein isolation technology by turning to an unassuming hero-sandpaper.

A common technique for isolating nucleic acids (either DNA or RNA) is using silica (the molecule silicon dioxide) as a resin to bind nucleic acid molecules that are passed through it in a liquid. To accelerate the process, centrifuges are sometimes used to force a sample through the resin. However, silica breaks down or becomes compacted under the enormous pressure-up to 14 thousand times that of the Earth's gravity-of being centrifuged.

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Web site:

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With NRC-IRAP support, Norgen began an intensive research program to see if other compounds of silicon might be more durable resins. While some proved to be chemically unstable or toxic, an unlikely form proved ideal: silicon carbide. Used as the grit in sandpaper (where the researchers' first scraped it from for their experiments), silicon carbide is second in hardness only to diamonds.

This unlikely resin candidate has another critical characteristic: its surface is innately electrostatically charged. Combine these qualities and you create a unique purification system-hard enough to withstand being centrifuged, and a natural electrostatic 'glue' for charged molecules.

"When you centrifuge it-Bingo!-in a few minutes you have a purified nucleic acid or protein and that's what attracted biotech companies," says Dr. Bautista, Norgen Biotek's Vice-President of Research and Development.

The development of this unique silicon carbide nucleic acid purification system has led to several international patents and a licensing agreement with Agilent Technologies, a major U.S. biotech company. Agilent's products are used worldwide in BioPharma, government, and academic labs.

"IRAP was instrumental in making this technology a reality," says Norgen's Dr. Haj-Ahmad. "We're driven by being first in the world, because if we're first we can patent. The most important aspect of IRAP's involvement has been the speedy and thorough assessment of our proposal. They didn't just evaluate the paper proposal, they asked questions, got our feedback, and they came here to see what we do."

Norgen has parlayed the silicon carbide technology into a licensing agreement with Toronto-based MDS Sciex for the development of protein purification kits, already available in Japan and soon in North America and Europe.

Following the growth path smoothed by sandpaper, the company has grown from a bare-bones start-up team to a staff of between 15 and 20 scientists. With ongoing NRC-IRAP support, Norgen is exploring applying its unique protein separation technology to the multi-billion dollar field of the bulk isolation of proteins in the pharmaceutical and food industries.

NRC-IRAP is a federal initiative that works closely with all kinds of small and medium-sized enterprises, helping them grow their businesses, increase their competitiveness, and enhance their impact in the marketplace. ■

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