

Creating economic reactions

By John Pastor

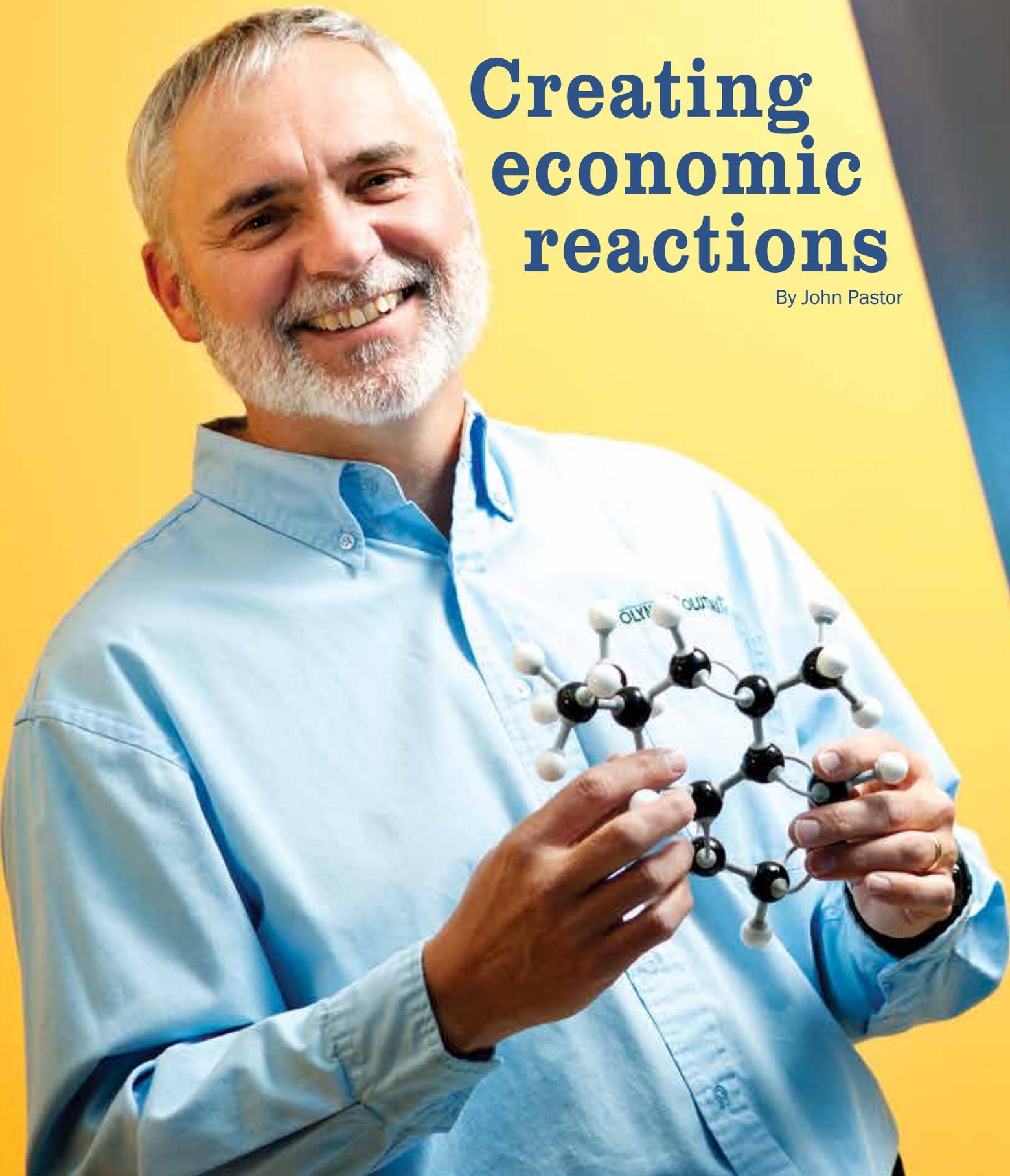


Photo by Logan Wallace

Polymer scientist mixes business, chemistry to transform independent laboratory testing

When James “Jim” Rancourt talks about Polymer Solutions Inc., the independent testing laboratory he founded in Blacksburg, it is tempting to steal plotlines for a TV series.

In one episode, a team of detective-scientists might be called to determine whether carbon monoxide in the lungs of a corpse means a home heating system repairman is guilty of manslaughter.

In the next mystery, the investigators figure out whether an estranged employee went into business for himself after stealing a formula for a specialty coating.

Or, in “Trouble on the Beltway,” the team zeroes in on what is causing one particular conveyor belt to repeatedly break down at a food-processing plant, taking the dough out of an unhappy baker’s pocket.

If it’s answers you want, Rancourt and his league of scientist-detectives know how to get them.

“My employees and I help people by providing reliable and trustworthy solutions,” said Rancourt. “If an assembly line shuts down because glue does not stick like it used to stick, or plastic is cracking when it never did before, we can tell our clients what’s wrong and what they need to change to fix it, and they can get back to making money again.”

One of those kids

Some people just take to research. During an interview with the Roanoke Times, Rancourt talked about how he, at about age 7, would grow plants in his bedroom and add different substances to their water supply, such as salt, just to see what would happen.

“Yes, I was one of those kids,” Rancourt said. “I got the chemistry set and I mixed much larger quantities than recommended in the instructions. But there was nothing dangerous about it, and the effect was always better if you used a lot instead of a little.”

He crossed some fateful roads before becoming a polymer expert — including an encounter with one high school teacher who was so terrifically bad that Rancourt nearly turned away from chemistry, and another who kept him on course.

As this story unfolds, Rancourt’s youthful interest in science recrystallizes in 1987 as Polymer Solutions, which serves clients in the consumer products, medical, pharmaceutical, aerospace, defense, and manufacturing industries.

Serious but fun, the company culture radiates a degree of nerdiness — how else can you explain the references to “Austin Powers” and “The Big Bang Theory”? And the truck that just arrived at the loading dock is creating a buzz — it’s a cargo of inexplicably defective baseball bats! The place has become a home for others like Rancourt, who have never gotten over being bitten by the science bug.

“I guess I never got past the point where I ask ‘why’ about everything,” said Alan Sentman, who received a Ph.D. in materials chemistry from the University of California, Berkeley, and did postdoctoral work at IBM before being recruited by Rancourt to manage the Applied Chemistry and Spectroscopy Lab.

Within the lab is an Inductively Coupled Plasma-Optical Emission Spectrometer, which heats materials to temperatures hotter than the surface of the sun to detect trace metals. The sample compartment can exceed 17,000 degrees Fahrenheit.

Rancourt and Sentman proudly share the tidbit about the sun. Such gee-whiz facts are invitations to climb into the world of materials chemistry, which can be daunting for the uninitiated.

Welcome to analysis

Rancourt looks for analytical skills and a candidate’s aptitude for chemistry when recruiting lab members, but “attitude and ethics are enormous.”

“A critical part of our interview process is to ask questions that get to the heart of how a person makes difficult decisions — say you discover you generated a bad data point, but no one will probably ever figure out that you did. What do you do? Do you report it; how do you report it?” Rancourt said. “Initiative is also a real key. With the variety of projects we work on, I can’t say to an employee, ‘here is what you are going to do today.’ And I need people who, when they get stuck, can collaborate with others and figure out how to get unstuck.”

A day’s work could involve testing toys for contaminants, or analyzing a new drug or medical product in accordance with Food and Drug Administration specifications.

The company also works with defense and aerospace industries to supply data about ammunition and explosives, gear used by soldiers, and adhesives used in aircraft.

As a materials expert, Rancourt testifies in court about



manufacturing and design defects, misappropriation of trade secrets, and patent infringement. He is also an inventor with seven U.S. patents, including one for Theragauze, a sterile polymer wound care dressing with nanopores that accelerates healing. More recently, he and colleagues developed a method for collecting DNA and fingerprints.

But had GPS navigation been around early in his career, Rancourt might have never received his graduate degree, founded a company, or been named to Virginia Tech's Faculty Entrepreneur Hall of Fame.

The road to Virginia Tech

Just married and finishing his undergraduate degree in chemistry at the University of Lowell in Massachusetts, Rancourt applied for a research position at Albany International Research Corp. He thought the lab was about 25 minutes from home, when it was really more than an hour away — a long haul for a newlywed trying to finish college.

"There is absolutely no doubt that working there would have never happened if I had been better at geography. I would have never made the trip," Rancourt said. "But it turned out Albany International was an amazing place to be able to work on a variety of products for clients who basically want immediate solutions. The environment was highly collaborative, and it was very easy to make a significant contribution."

Rancourt elevated the existing thermal analysis laboratory from an array of misunderstood and underutilized instruments to an arsenal of project-advancing tools. He later arranged with his bosses to travel to Virginia Tech to attend a polymer short course, at the time taught by professors James E. McGrath and Thomas C. Ward of the College of Science, and Garth L. Wilkes of the College of Engineering.

It was another fateful trip.

"That's when I really got excited about polymer chemistry, which is what we do at Polymer Solutions. The professors had so much passion, and just being at Virginia Tech a week, I could see these amazing collaborations taking place," Rancourt said. "People who were creating plastic materials were collaborating with people who turn materials into adhesives or glues, and they were collaborating with people who needed to figure out how to

process the material in an extruder and make a composite panel or something useful — I was really impressed."

A dash of showmanship

The die was cast. Rancourt returned to Massachusetts, gave nine-months' notice, and relocated to Blacksburg, where he began work on his doctoral degree under the guidance of Larry Taylor, now an emeritus professor of analytical chemistry in the College of Science.

They worked on electrically conductive plastics for NASA, and developed a nontoxic replacement for liquid mercury for use in switch applications, patented in 1995.

"Jim always added a little bit of showmanship," said Taylor, who was an assistant professor of chemistry when he first met Rancourt and his wife, Cynthia. "For the mercury replacement product, he found a dentist in the area who was able to obtain a tooth, drill a hole into the specimen, and fill it — just to add something interesting to the demonstration.

"We would make periodic trips to NASA at Langley Air Force Base to give progress reports, and Jim had been working on ways to measure electrical properties of polymers," Taylor continued. "Jim had taken a metal — gold — and incorporated it into a polymer, so when the polymer cured, a metallic surface on the plastic material formed the Virginia Tech logo. He always had a little surprise in his back pocket to get people interested and help them understand his work."

His ability to make materials science accessible made Rancourt influential with up-and-coming students at Virginia Tech, according to Taylor.

"I think we shared the philosophy that we weren't doing our jobs if we didn't produce students who were smarter than we were," Taylor said.

Today, Rancourt remains a serial teacher.

During a hallway conversation, while he is absently twisting and rearranging a 3-D plastic model of a molecule, he suddenly holds it up to an unsuspecting passerby and calls out, "What would happen if molecules like these were burning?"

"They would be hot?"

"OK, but, what would happen? Look at the structure. It would create a whole lot of dark smoke, wouldn't it?" Rancourt said. "Can you tell me why?"

A random act of teaching was in progress.

Paint the walls

As part of a self-styled business and leadership training program, Rancourt likes to read biographies. A favorite is about Sir Ernest Shackleton's legendary Antarctic expedition from 1914 to 1916. Twenty-eight men survived nearly two years

after their ship, *Endurance*, was thrown off course and crushed between packs of ice.

Businesses, too, endure setbacks and bad weather. Since its founding, Polymer Solutions has navigated through several recessions. The business maintains healthy cash reserves, but a significant part of the company's income is from cases involving materials failure, where a law firm is the client. When the economy shrinks, that part of the business shrinks, too. It's not like being grounded in the Antarctic, but it can have a chilling effect.

"Shackleton kept his men alive on an iceberg even when all seemed hopeless. The principles he used when all seemed lost and the ship was sinking were very useful when business slowed down," Rancourt said. "One simple thing is to keep people busy, so we repainted the place. You don't paint a sinking ship. Just from a morale perspective, my message to my staff was we are not sinking. We are low on fuel, but we are not sinking, and we are going to be really busy soon, so while we have a lull, let's paint the ship."

He credits his staff for transforming Polymer Solutions into a strategic resource for clients ranging from small start-ups to large corporations in locations around the world, including Costa Rica, Ireland, Germany, Puerto Rico, Thailand, Malaysia, Poland, and China.

And, of course, they solve mysteries.

This is how it ends

Remember the heating system installer who was accused of being responsible for someone's death? Not guilty. Rancourt testified that the coroner's method of using gas chromatography with a thermal conductivity detector was inadequate to measure carbon monoxide in the lungs of the deceased. Also, natural atmospheric carbon monoxide and the possibility the gas was generated during decomposition were not taken into account. The charges were full of hot air.

And the ex-employee accused of stealing secrets? Rancourt's team analyzed the company's specialty coating as well as the one the former employee was selling. Not only were the amounts and types of chemicals in the coatings the same, further analysis showed the compounds were identical at the molecular level. Elementary, you might say.

And today the unhappy baker is smiling. Using techniques of optical microscopy, differential scanning calorimetry, and Shore D testing, the scientists discovered the crystalline structure of the conveyor belt was degrading during the normal manufacturing process. Polymer Solutions provided the recipe to correct the problem and the baker was back in business again — as easy as pie.

James D. 'Jim' Rancourt

Guiding principles

The golden rule: Treat people fairly, the same way you would want to be treated. When people come to us, many of them in a way are like patients seeking medical attention — they usually don't know what tests they need. They rely on us to tell them. Often enough, a testing lab could tell a client anything, and the client wouldn't know the difference. We just don't do that. It is our responsibility to be fair and trustworthy.

On hiring

You can never afford to pay good people what they're worth, ever. If they have the attitude, aptitude, and initiative, wouldn't you call them an invaluable employee? When we hire people, we pay good salaries, but we intentionally do not pay the highest industry salaries. People who choose their jobs for the highest salary will always leave when they can get a higher salary somewhere else. So a good salary, our serious but fun environment, our culture, our team approach — all of that is part of the package; plus, Blacksburg is a nice place to live.

On becoming an entrepreneur

People going into business need to have a little bit of a fan club to provide encouragement, because it can be discouraging.

It is critical, right from the beginning, to network. There are people who really need to know a piece of what's in your head, your knowledge. And it's important in terms of your own creativity to create opportunities to learn from different people. The Roanoke-Blacksburg Technology Council is a good example: People from a variety of technology disciplines come together to mutually promote one another's success, and the success of the greater Roanoke-Blacksburg region. Polymer Solutions is also part of the Virginia Economic Development Partnership's VALET Program, a state program that promotes international trade for companies across the state of Virginia. This directly supports the expansion of the individual company and the state's economy.

More entrepreneurs

Virginia Tech Magazine also highlights entrepreneurs, university spin-offs, the technology business, and the increasingly important academic connection between a research university and job creation.

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