

Alumnus a Global Leader in Nano-structured Materials

By Ruth Weinstock



Alumnus Dr. Gino Palumbo (second from left) is President and CEO of Integran Technologies Inc. (ITI), an award-winning firm strongly linked to UofT engineering. Among the UofT Professional Experience Year (PEY) students working at ITI's Toronto headquarters are: (l.-r.) Leona Smith, Thomas Arato, Marc Suralvo and Ian Winfield.

Dr. Gino Palumbo has a tiger by the tail.

As CEO, President and Co-founder of Integran Technologies Inc. (ITI), a supplier of nano-structured material technologies, Palumbo and his associates have parlayed innovative research on improving the properties of materials into more than 100 patents, a dizzying array of applications, an international customer base, several spin-off companies and multiple awards.

And it looks like there is more to come.

"A lot of the fundamental research on which our company is based originated at UofT," explained Palumbo, a triple grad (M.S.E. (formerly M.M.S.) 8T3; MASc 1985; PhD 1989). "We took this technology from pie-in-the-sky-science to commercialization. We are one of few companies that can put nano-metal products in your hand."

The company holds one of the first U.S. patents issued in nano-technology (the precise manipulation of individual atoms and molecules) dating to 1993. It is also one of the first in the world to execute bulk nano-structured materials for specific structural applications, including the award-winning Electrosleeve™ process for steam genera-

tor repair. In collaboration with Professor Uwe Erb of the Department of Materials Science and Engineering (M.S.E.), ITI also developed the first major commercial applications for electro-magnetic nano-materials.

Lower cost, higher performance materials are ITI's signature. By altering the grain boundaries of materials, attributes - such as resistance to corrosion and wear, strength, hardness and energy absorption - can be improved. The result? Longwearing hip and knee implants, lightweight, rugged golf clubs and car parts, stronger watch gears, anti-microbial medical instruments, and even sunscreen with enhanced UV protection.

ITI's global client network includes Waterpik, the U.S. Department of Defense and Vasotube, a German medical tubing manufacturer. Operations include R&D for process and product design solutions, contract manufacturing, material sales and technology licensing for automotive, biomedical, aerospace, defense, nuclear, cosmetics and sporting goods applications.

Two proprietary methods for nano-material production give ITI its 'edge'. The Grain Boundary Engineering™ process alters the internal structure of materials on the nano-metre scale to dramatically improve features, including durability. The award-winning NanoPLATE™ process adds nano-structured layers to surfaces. When used to replace electroplating, it eliminates environmental problems.

Although their work is the stuff of tomorrow, ITI and its predecessors have been in the forefront of metallurgical nano-technology for more than 20 years. The company's roots date to the internationally recognized research of Professor Emeritus Karl Aust (PhD 1950), an MSE faculty member at UofT from 1967 to 1991. Aust is still active at ITI and UofT.

Palumbo's imagination was captured by working with Aust at UofT, first as an undergraduate and later as a grad. In Aust's lab, Palumbo also met Uwe Erb, then a post-doc, and later a key figure at Integran. In 1985, Erb became the first to synthesize fully dense nano-structured materials. He has received multiple awards, particularly for his work in nanocrystalline metals. He held the Ontario Hydro Technologies NSERC Industrial Research Chair in Micro-Engineered Materials.

In the early 1990s, when Erb and Palumbo were both working at Ontario Hydro, their team developed technology for repairing nuclear reactors still used today. Their team also developed a technique for prolonging the life of lead acid car batteries, motivating Hydro to spin off a separate company. Integran was formally launched in 1999 by Palumbo and four Hydro colleagues.

Two and half years ago, after a management-employee buyout, ITI began a growth spurt, launching three spin-off companies. Power Metal Technologies Inc., a California-based sporting and consumer goods affiliate, supplies game-changing components for golf, baseball, cycling and hockey, as well as tennis racquets manufactured by Head.

A second company, Morph Technologies, commercializes ITI's nanocrystalline electrodeposition technology for automotive applications. The third spin-off, Pittsburgh-based Integran Defense Systems, recently signed an agreement with Science Applications International Corporation (SAIC) to pursue opportunities in aerospace and defense. SAIC operates in 150 cities worldwide and, in January 2006, reported annual revenues of \$7.8 billion. ITI also plans future biotech and electronic materials spin-offs.

ITI has strong links to the Faculty. Of 35 employees in its Toronto headquarters, about 20 are UofT alumni. The firm works extensively with MSE Chair Professor Douglas

Perovic, as well as Professors Aust, Erb, Glen Hibbard (a former ITI employee) and Robert Pilliar, of the Institute of Biomaterials and Biomedical Engineering and the Faculty of Dentistry.

In addition to PhDs from UofT active in research at ITI, eight UofT undergraduates are currently doing a 16-month Professional Experience Year (PEY) there.

"The light bulb goes on in their heads when they arrive here," Palumbo remarked. "I hope to do for these students what Karl Aust did for me – make engineering a creative endeavour."