15 inspiring years
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veski innovation fellow

Associate Professor Timothy Scott

research project

Multi-Colour Irradiation Systems for Ultra-Rapid Additive Manufacturing

project summary

Three-dimensional printing is a cutting-edge technology proving to be tremendously useful during the design and prototype stages of industrial production. Also known as additive manufacturing (AM), the worldwide market has grown by up to 30 per cent per year over the past decade, with revenues from services and products totalling more than USD$7.3 billion in 2017.

Despite this growth, for 3D printing to truly disrupt global manufacturing its speed must dramatically increase.

Associate Professor Timothy Scott has developed an ultra-rapid method of 3D printing. This breakthrough technology is 'one of the first true 3D printers' that uses two beams of light, and light-sensitive resin, to enable high speed, continuous production.

The technique starts with a liquid that is solidified by irradiation with visible or UV light. By patterning that light the method allows you to make three dimensional objects of your choosing. The use of highly viscous, filled resins enable fabrication of composite objects with mechanical and thermal properties far exceeding those of parts made by other contemporary AM approaches.

Existing methods of AM rely on a 'dead zone' to prevent the emerging object from adhering to the resin projection window. This new method adopts a stereolithographic approach where one beam of light is used to solidify the liquid resin and another prevents the parts sticking to the printer window.

The biggest potential of this technology will be in the agile manufacturing of low to moderate volume parts quickly and inexpensively. The recent decrease in Victoria's consumer manufacturing sector, including automotive manufacturing, was due in part to the expense of out-dated, large-scale production methods. This approach is ideal for supporting smaller manufacturing production needs in Victoria.

Timothy's research focus on increasing fabrication rates of the production of polymeric and composite objects will boost Victoria's start-up community and entrepreneurial culture. This breakthrough technology and research will provide extensive entrepreneurial opportunities for scientists and engineers in the rapidly expanding and locally-relevant industry.

The commercial potential of distributed manufacturing that is facilitated by this advance in 3D printing will also support local industry and economic growth through training, jobs, and apprenticeships. There are also significant environmental and public health benefits enabled by reducing transportation emissions and energy consumption related to offshore production.

Timothy brings extensive skills in polymer science to Victoria. His particular specialisation in self-assembly and in the interaction of light with polymeric materials has the potential to advance 3D printing to achieve significantly greater penetration in medical, dental, automotive, and aerospace markets.

This will fundamentally transform AM processes and provide a value proposition for a wider range of potential customers.

Associate Professor Timothy Scott is a senior member of the Department of Chemical Engineering and the Department of Materials Science and Engineering at Monash University.

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Associate Professor Timothy Scott

"The real benefit of increasing fabrication rates is the transition from prototyping, making one offs, to actually going into production."

personal history

Associate Professor Timothy Scott is a world leader in photo-mediated polymerisations, bringing unparalleled expertise with stereolithography to Victoria. To support his research, Timothy has secured in excess of three million dollars in research funding from federal agencies and industry in the USA including NASA, the National Institutes of Health, 3M Company and the Department of Energy.

Some of his major career achievements include developing materials that alleviate stress during polymerization. These composite restorative materials have been licenced to 3M and have become multi-billion dollar products used clinically in the dental industry.

Associate Professor Scott obtained his BSc (Hons) in Chemistry from the University of Melbourne in 2002 and a PhD in Materials Engineering from Monash University in 2006. He then undertook a postdoctoral research position at the University of Colorado at Boulder followed by an appointment to a research assistant professorship in the Department of Mechanical Engineering at the same institution.

From 2008, Timothy was assistant professor in the Department of Chemical Engineering at the University of Michigan, Ann Arbor. In 2018, he was promoted to associate professor and awarded tenure.

In addition to his research, Timothy is responsible for building a start-up company and is actively pursuing venture capital to advance the development of his work.

He returned to Victoria in July 2019 with his wife and children to join him in early 2020.

other innovation fellowship recipients:

Professor Andrew Holmes AC FRS FTSE AAAS
Professor Marcus Pandy
Adjunct Assoc. Professor Gareth Forde
Associate Professor Alyssa Barry
Professor Michael Cowley FTSE
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veski innovation fellows have secured more than $68m in research income to date delivering an 18.4:1 economic return on investment. Their research covers semiconductors, epigenetics, audiology, optics and nanotechnology, enzymes, dengue, malaria, cancer, inflammatory diseases, musculoskeletal health, geothermal energy, obesity, computational fluid dynamics, bio-medical imaging and immunology.

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