

IP and Copyright

Part 2: Introduction

“Patents need inventors more than inventors need patents”

Kalyan Kankanala

Intellectual Property (IP)

- IP is an important way of incentivizing/rewarding innovation. It promotes the disclosure and dissemination of technological information, which is supposed to help growth and development.
- IP is like other **property**. It may be sold; may be bought; may be leased or rented; may pass under a will; and may be assigned.

Types of IP

Design patent	A design patent may be granted if the product has a distinct configuration, distinct surface ornamentation or both
Utility patent	A utility patent has a detailed technical disclosure along with drawings (where appropriate) and one or more claims; the claims of a utility patent list the elements of the invention and establish the boundaries of patent coverage
Plant patent	A plant patent is granted by the government to an inventor who has invented or discovered and asexually reproduced a distinct and new variety of plant
Copyright	Copyright deals with the rights of intellectual creators in their creation; it is a form of protection given to the authors or creators of original works of authorship, including literary, dramatic, musical, artistic, and other intellectual works
Trade secret	Trade secrets include any valuable business information that derives its value from the secrecy
Trademark	A trademark is a recognizable sign, design, or expression which identifies products or services of a particular source from those of others, although trademarks used to identify services are usually called service marks

Laws for IP Protection

- Copyright Act 1987
- Trademarks Act 1976
- Patent Act 1983
- Industrial Design Act 1996
- Geographical Indications Act 2000
- Law of Tort
- Confidential information

International Conventions for IP

- **1989:** Paris Convention for Protection of Industrial Property 1967
- **1990:** Berne Convention for the Protection of Literary and Artistic Works 1971
- **1995:** Trade-related aspects of Intellectual Property Agreement 1994
- WCT (digital agenda)
- PCT 2004

Copyrights

Applies to written and artistic work as well as software

- “exclusive legal right to reproduce, publish and sell a work”
- <http://publications.gc.ca/site/eng/ccl/aboutCopyright.html>
- Note that copyright protects the code itself (i.e. plagiarism), but **not** the functions that the code performs

Copyrights

Who owns the copyright?

- The author or her/his employer, performer, recording maker, broadcaster
- Can be assigned (transferred or sold)

How long does it last?

- **Fifty years** after the end of the year in which the author/creator dies
- After that, works are in the public domain

When is copyright “granted”?

- Does not need to be registered, exists immediately upon creation of the work
- The Bern convention ensures your copyright holds around the world

Part 2: The Alumnus Perspective and an Overview of Patents

Vijay Narasimhan, PhD

My academic journey around the world

- uOttawa - BAsC Computer Engineering (Co-op) 2007
- Cambridge - MPhil Nanotechnology Enterprise 2009
- Stanford – PhD Materials Science and Engineering 2015
- A Canadian Engineering degree is one of the most valuable pieces of paper you will ever hold.



Testing for my black belt in Taekwondo, a sport I picked up at uOttawa



Punting on the Cam after my Masters exams.

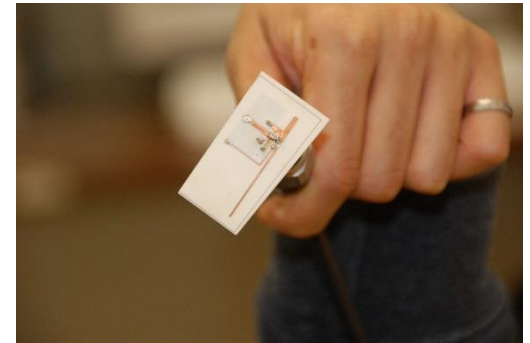


Rafting in Yosemite National Park with my Stanford lab group.

Past Research and Work Experience

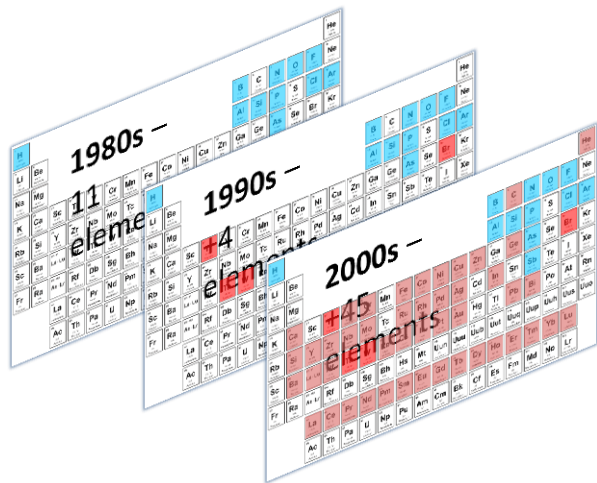
I hold 3 issued patents

- Co-ops and contracts
 - NRC (circuit board design)
 - Quake Technologies (analog ICs)
 - Curtiss-Wright Controls (hardware engineering)
 - Carleton University (Tait – MEMS research)
 - University of Ottawa (Hinzer – solar research)
- MEMwave Inc. (my own startup)
 - Developed and new frequency-agile antenna
 - US 8339328
- United Nations Foundation
 - Looking at renewable energy solutions in developing markets
- Stanford University
 - Developed nanotechnologies for solar cells and optical sensors
 - US 9140602, US 9537024



What do I work on now?

Within every circuit there are devices, and within every device, dozens of materials and processing techniques are working together. I work on developing the next generation of high-performance materials for computing.



Platform Highlights

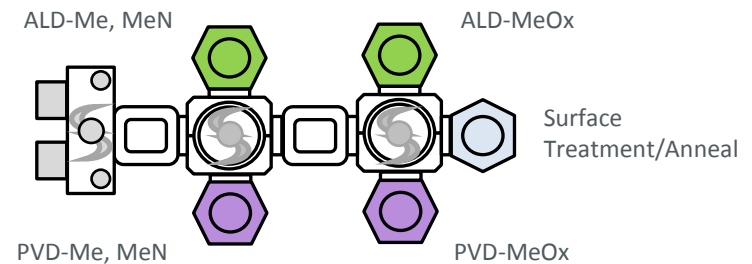
Intermolecular designed and built an advanced R&D platform for thin film deposition, enabling rapid exploration of complex materials

- Cluster platform to enable in-situ processing
- A-30 ALD (Atomic Layer Deposition) systems enable full-wafer or quadrant-isolated depositions
- P-30 PVD (Physical Vapor Deposition) systems enable gradient or site-isolated depositions

Combinatorial Wafer with ALD quadrants and PVD spots



Example Cluster Configurations



Intellectual property at Intermolecular

Our customers have included Sandisk, Toshiba, Micron, Samsung, and SK Hynix



Unique high-throughput experimentation platform

State-of-the art development facility and characterization

World-class interdisciplinary team

Flexible, outsourced R&D materials innovation services

Fast Facts	Founded in 2004	Leadership Team	2016 Revenue
	Went Public in 2011 (Nasdaq: IMI)	Chris Kramer, President and CEO Tony Chiang, CTO Milind Weling, SVP	\$47.3M

Between 16-25% of our annual revenues have come from our patent portfolio!

\$7.5M
from patent royalties

What is a patent?

Canadian definition

- “a right, granted by government, to exclude others from making, using, or selling your invention in Canada”
- http://www.cipo.ic.gc.ca/eic/site/cipointernet-internetopic.nsf/eng/h_wr00001.html
- Designed to ensure that ideas are made public and so technology can advance. However in software, many argue that there are so many ideas in any program that patents hinder progress

Should you patent your invention?

- A patent is a **chain link fence**: you have protection for some time, but everyone can see what you're doing!
- A trade secret is like a **tarp cover**: no one can see what you're doing, but if someone independently comes up with the same idea, you have no protection.
- Factors to consider:
 - How easy is it to copy your invention?
 - How wide a patent can you claim (i.e. could someone work around/sidestep your patent)?
 - How much money do you have?

Is your invention patentable?

3 main criteria for patenting

Useful (lowest bar)

- Can't patent impossible things (e.g. perpetual motion machines), natural discoveries (genes), or things that are not sufficiently described.
- Note: in many jurisdictions, software is more difficult to patent (usually has to be more than an abstract idea/algorithm/data structure)

Novel (medium bar)

- No *prior art* that demonstrates someone has made the invention before, e.g. another patent in Canada or elsewhere, a journal publication, sometimes even a conference presentation
- Need to differentiate your invention after an exhaustive search

Non-obvious (highest bar)

- Obvious if an “unimaginative skilled technician, in light of his *general knowledge* and the *literature and information* on the subject available to him, would have been led *directly and without difficulty* to [the] invention.”
- Rejections often rely on combining aspects of two inventions

Key elements of a patent



Nanopillars Hide Solar Wiring

Metal wires made invisible with nanostructures could increase silicon solar cell efficiency by over 20 percent

By Dexter Johnson

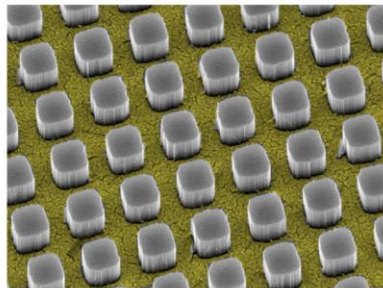
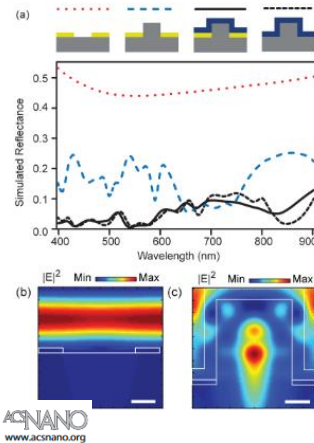


Image: Stanford University
Silicon nanopillars funnel light through a gold metal contact to a sheet of silicon underneath.



Hybrid Metal–Semiconductor Nanostructure for Ultrahigh Optical Absorption and Low Electrical Resistance at Optoelectronic Interfaces

Vijay K. Narzinhani,¹ Thomas M. Hymel,¹ Ruby A. Lai,¹ and Yi Cai^{1,2,3,4}

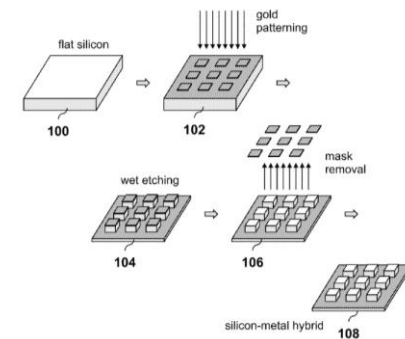


U.S. Patent Jan. 3, 2017 Sheet 1 of 16 US 9,537,024 B2

The invention claimed is:

1. An optoelectronic device comprising a hybrid metal-dielectric optoelectronic interface disposed above an underlying substrate, wherein the hybrid metal-dielectric optoelectronic interface comprises i) an array of nanoscale dielectric resonant elements, and ii) a metal film disposed between the dielectric resonant elements and below a top surface of the resonant elements such that the dielectric resonant elements protrude through the metal film;

Fig. 1A



- Inventors (& assignees):
 - Who really contributed to the invention?
 - Different than authorship on a report or paper
- Background:
 - What work came before your invention? Why is your contribution useful and important?
- Summary, description, and drawings:
 - Lay out what you're trying to patent in sufficient detail so someone can replicate it
 - Include as many working variants as possible – much more thorough (& confusing) than a paper
- Claims:
 - These are the most important part: they define the scope of what you're inventing and what you can enforce.

How much does a patent cost?

- Requires fees to file the patent and to ‘maintain’ it plus fees for patent agents to help you through the process
 - \$15k-\$30k is a good estimate if you are filing in one country
- Patent examiners often raise objections, requiring changes before a patent is granted. There may be many iterations
- Patent must be applied for in every country where you want protection – the Patent Cooperation Treaty allows patent priority date to be the same in multiple countries
- “Right to exclude” means the onus is on you to enforce your patent – this also costs money
- Ownership of patents can be assigned to others (sold)
 - Often the case when you work for a company

Good Luck!

- Feel free to contact me with any questions:
 - vijay.narasimhan@intermolecular.com
- Check out Intermolecular's website:

