

# Inspiring Research In Ireland

The Irish Research Council for Science, Engineering & Technology (IRCSET) has been helping the most gifted graduates to achieve their potential for the last ten years. And speaking to Joanne Hunt, Chairperson Professor Anita Maguire explains how they can help for many more years to come.

“It’s critical that we hold our nerve and maintain our commitment to research for the future of this country,” says Professor Anita Maguire.

As the Vice President of Research and Innovation at UCC, and someone who, in her day job, has graduated 26 PhD students in the past ten years, Prof Maguire knows first-hand how supporting our brightest and best in further study has been transformative both for them and for our economy.

But it’s in her role as Chair of the Irish Research Council for Science, Engineering & Technology (IRCSET), a body set up to support talented early-career researchers to advance their studies in the sciences, that she sees that power for transformation on a national scale.

Founded ten years ago and funded by the Department of Education and Skills, IRCSET’s mission is to support exceptional researchers towards new concepts, findings and innovations for Ireland.

When a decade ago other countries ranked well ahead of Ireland in investment in research, and consequently in the volume of patents registered by their researchers, it was clear a strategy was needed to ensure Ireland’s competitiveness.

“About ten years ago there was very much a recognition that for Ireland’s future, it was important to develop a research infrastructure to drive our overall development as a country,” says Maguire.

“The establishment of IRCSET was a real opportunity to directly support early-career researchers where there had been no support in the past.”

Every year since its founding, IRCSET has run a highly competitive process by which talented masters, doctoral and post-doctoral researchers in science, engineering and

technology can apply for funding to advance their research training.

But while there is a clear emphasis on innovation, IRCSET differs from other funding bodies in that it’s not prescriptive about research outcomes.

“The focus of the programme is very much about the people and the area of research that excites them,” says Maguire of the IRCSET’s vision.

With research projects spanning everything from astronomy to the fundamentals of molecular biology, the council’s ethos is about opening up discovery.

“Many of the projects would be in what you might describe as early-stage blue-skies research,” says Maguire. “You’re very much challenging the frontiers of knowledge.”

“It’s very important that a certain amount of your research funding is dedicated to pure blue-skies curiosity because that way, you are exploring the unpredictable.”

But talk of blue-skies research needn’t fool you into thinking the research and the skills developed by awardees cut any less ice in the workplace.

“By funding a student’s PhD, you are fundamentally developing them,” says Maguire. “The ability to search through literature or design experiments in order to test a hypothesis, to analyse the outcomes and the confidence that you can actually work through that process – to me that’s the critical element of a PhD.”

With a 2009 report by the Advisory Council for Science, Technology and Innovation finding that Irish R&D firms employing PhD researchers had rates of patenting two and a half times greater than similar firms which did not employ PhD researchers, it’s clear that IRCSET’s faith in funding research to drive innovation is

well placed.

And the Enterprise Partnership Scheme, whereby IRCSET links with private enterprise and public bodies to award co-funded Postgraduate Scholarships and Post-Doctoral Fellowships to the most promising researchers ensures that their work is firmly rooted in the real world.

Comprising 120 enterprise partners, a veritable who’s who of science, engineering and technology companies, the scheme offers researchers the opportunity to gain experience and insight into the commercial arena while completing their research.

“What happens here is that the supervisor and the enterprise partner work together to mentor the researchers, and frequently the researcher would spend part of their studies in the company, getting hands on experience,” says Maguire.

It’s a win for both researchers and Irish companies, she believes.

“For PhD students, it means they come out the other end of

their PhD not only having a very strong research training but also having an insight into the enterprise environment,” says Maguire. The same is true of the post-doctoral participants in the scheme.

“The companies involved have been hugely positive about the programme and it also means the areas of research IRCSET is supporting are aligned to the interests of the enterprise sector.”

With IRCSET’s alumni already beginning to make their mark in science, engineering and technology careers, the future of innovation for Ireland is bright.

Though a 2004 OECD review of higher education warned that an insufficient supply of doctoral students was seriously hindering Ireland’s aim to stimulate research and development, by 2006 through initiatives like IRCSET, the trend was being reversed.

In fact by 2006, Ireland had already increased its number of PhD graduates by 37%, giving us one of the fastest annual

growth rates of PhD graduates in the OECD and placing us slightly ahead of the average throughput of PhDs in science and engineering.

“The trajectory that we are on would be very highly regarded internationally,” says Maguire, “and it’s important that we remain on that trajectory,” she adds.

“It’s people who start up new companies and spark new ideas. Investing in the type of people who will ultimately pull us out of our economic challenges is the most important thing we can do.”



Anita Maguire Chairperson of the Irish Research Council for Science, Engineering & Technology

## Investing in a new Ireland

The Government and major corporations, such as Intel, are investing in researchers who are the business leaders of the future.

The Enterprise Partnership Scheme facilitates postgraduate and postdoctoral researchers to work with a company in their area of expertise. One of the companies availing of the scheme is Intel, and their education and research manager Pádraig Ó Murchú sees it as hugely beneficial to the future of Intel, and the researchers.

Operated by IRCSET, the scheme, which helps builds

links between researchers and enterprise boasts some 120 companies within its remit and provides funding for up to 279 postgraduate and postdoctoral researchers from all ROI Higher Education Institutions.

“As a result of the Enterprise Partnership Scheme, Intel is able to triple the amount of Intel-sponsored researchers. This has allowed us to build more relationships and allowed us access to more researchers,” says Dr. Ó Murchú.

For Intel, developing a relationship between the education and IT sectors is beneficial.

“Intel assigns a mentor to each of its co-sponsored researchers whose role it is to provide career advice, monitor the researcher’s progress and provide assistance with project planning and goal setting. All Intel researchers are invited to participate at our Intel European Research and Innovation Conference,” says Dr. Ó Murchú.

Each research award is co-funded by both the company and IRCSET. Other firms taking part in the scheme include IBM, Boston Scientific and SMEs such as Solarprint. More information can be found at [www.ircset.ie](http://www.ircset.ie).

# IRCSET

## for success

Three of the successful applicants for IRCSET funding speak about how it helped them achieve their ambitions.

**Dana Miller (27)**  
**IRCSET Awardee 2008**  
**Research Topic: Ireland's seafood industry: working towards sustainability**

**M**y research is about the sustainability of Ireland's seafood industry and how the industry and our eating habits are influencing the marine environment.

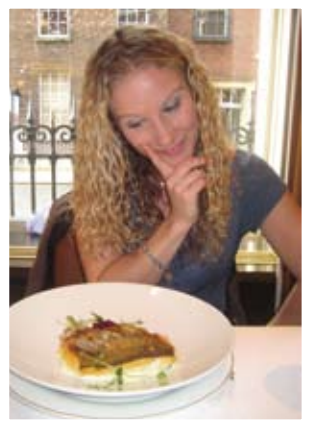
I'm Canadian and studied marine biology at the University of British Columbia. In 2008, I received IRCSET funding to pursue my PhD at UCD's school of Biology and Environmental Science under Dr. Stefano Mariani.

My research looks at the long-term records in fisheries landings by both Irish and international vessels in Irish waters, the market availability of seafood here over the last century, the mislabelling of seafood and how that links into patterns of consumption and production over the last century.

One of the most important things we've discovered is that catches and landings of some of the most commercially important fish here have declined substantially over the last century.

Cod is by far the most popular white fish available in the Irish market, however the amount of cod caught and landed in Ireland has declined by 90% since reaching a peak in the 1980s. The commercial fishery of salmon is basically closed in Ireland since 2007.

The surprising thing is that, though Irish vessels in Irish waters are catching little of



these two fish, they are highly available in the marketplace – so there's a mis-match between what's being caught and what's being sold.

The result is that the decline in wild fish is being concealed from Irish consumers by imports and by farmed fish.

We've also identified a mislabelling problem – a lot of the cod that's being consumed in Ireland is not actually cod.

I wouldn't have been able to take part in this research were it not for IRCSET's support.

The IRCSET funding is great because it gives you such freedom - if your research takes a certain direction, you can follow that direction.

I think the lessons from this research are that it's important for consumers to ask questions. It also highlights the responsibilities of policy makers.

The freedom in this funding has been the biggest benefit to me. It's just fantastic.

**Domenico Pepe (31)**  
**IRCSET Awardee: 2010**  
**Research Topic: High-speed wireless communication**

**I**n simple terms, my research is about designing microchips that will enable high-speed wireless communication.

For the person on the street, it might mean being able to watch a movie in high definition on their phone, but it has many other applications too.

I'm based at the Tyndall National Institute in Cork. I studied electronic engineering at the University of Pisa in Italy where I completed my PhD. I came to Tyndall two years ago and it really is one of the best research institutes in Europe.

Microelectronic circuit design is a significant part of Ireland's GDP and Ireland has a long history of expertise in the area. A few years ago, Tyndall identified the opportunity to develop expertise in next generation high-speed communications. IRCSET's funding is enabling me to further that opportunity.

My supervisor Prof Domenico Zito supported me to apply

for the funding and receiving it has given me the opportunity to pursue internationally competitive research in a leading research group.

My project proposal was aimed at exploring microelectronics, focusing specifically on high-speed wireless video communication. The research has the potential for huge mass-market applications in areas like medical imaging, environmental remote sensing, and collision avoidance radars.

My work entails designing microchips that enable the very high-speed transfer of data between devices in a wireless way. The chips that we design and test are very small, just a few square millimetres, so they can be installed in any portable device.

With IRCSET's support, I've been able to travel to workshops and conferences in Ireland, Portugal and Switzerland to meet



and work with international experts.

This post-doctoral work has enabled me to both further my skills and consolidate what I learned in my PhD. I've also had the chance to collaborate closely with academics and industry experts.

I hope my work will help to progress the Tyndall Institute and Ireland towards increasing competitiveness.

I have one more year of IRCSET funding left. After that I would like to continue my research and I'm very open to doing that in an industrial environment.

**Aisling Ní Annaidh (26)**  
**IRCSET Awardee 2008**  
**Research Topic: The mechanics of stabbing**

**M**y research is about the mechanics of stabbing and it came about through collaboration with the office of the State Pathologist.

A problem for pathologists is that when giving court evidence in murder trials involving a stabbing, they are often asked what kind of force would be needed to cause the wound. They might answer that it was 'a considerable force' or 'an extreme force'. My project aims to calibrate that force to a recognisable scale.

I'm looking at quantifying how much force somebody would need to exert to cause a stab wound. Knowing this will help us say more accurately whether the stabbing was deliberate or accidental.

It's really about trying to move a pathologist's evidence from a qualitative, descriptive thing into a more scientific and

quantitative result.

I studied mechanical engineering at UCD. My final year project was in bioengineering, which I loved and that's how I got started in this field.

I heard about the IRCSET PhD funding and with this collaboration with the State pathology lab in mind, my lecturers encouraged me to apply.

I'm in the third year of my PhD now under Prof. Michael Gilchrist and Dr Michel Destrade and my research would not be possible without IRCSET's support.

My first two years were spent at UCD and I spent last year in Paris at the Université Pierre et Marie Curie. With IRCSET's support I've also travelled to Lyon where I've been able to conduct tests on human skin through people who have donated their bodies to science.



Doing a PhD really expands your knowledge. You have to be one of those people who are willing to go out and work independently.

I'm hoping to finish my PhD this year. In terms of bringing my research into reality for the good of society, it would be great to see some of my work used by the State Pathologists.

And it's not just in Ireland; if I do come out with some significant results, my research could be used worldwide. That would be really exciting and would make it all worthwhile.