Each month ACN asks a team member to provide a profile of themselves that takes us behind the scene on what are the influences that encouraged their career choices.

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Q&A with Bakul Gupta

Bakul Gupta attained her PhD in 2014 under the supervision of Prof Justin Gooding at ACN, UNSW. Since submitting her doctorate Bakul is working as a Post Doc in the area of nanomedicine. Her research project involves the use of porous silicon photonic crystals for detection of protease activity in vivo.

Bakul arrived in Australia from India to study Nanotechnology at UNSW in 2006. After graduating with B.Sc Nanotechnology (1st class honours) and Diploma in Innovation Management in 2010, she went onto to do a PhD in Nanomedicine/Chemistry. She was a successful recipient of an International postgraduate research scholarship. In 2012, Bakul was selected as the UNSW representative at the HOPE Noble Laureate Meeting in Japan. Bakul was one of the five postgraduate students to be selected by the Japan society for promotion of Science to represent Australia at the event.

What was your inspiration in becoming a chemist?
I come from the School of Chemistry at UNSW but I’m not really a chemist. My inclination has always been towards medicine. I have always been fascinated by the functioning of the human body and intrigued by how health is maintained and illness treated. This fascination and appreciation for medicine, combined with my training in theory along with the quest for generating new ideas and the challenge of coming up with something original led me to take up a doctoral program in NanoMedicine at the Australian Centre for NanoMedicine (ACN).

What inspires you about ACN?
ACN is one of the best centers in the world with a strong orientation towards research in medicine using nanotechnology. The purpose of my PhD is to make an optically active, nanoporous material for the detection of increased protease activity in the eye during an infection called Uveitis. It’s a multi-disciplinary project since it requires skills in the areas of chemistry, physics and biology and this multi-disciplinary approach is provided at ACN.

ACN has given me an opportunity to work with an eminent faculty and contribute to the world of medicine because I believe medicine along with nanotechnology can serve to improve the quality of life and lead to a new era of health and longevity of mankind.

Tell us about your work at ACN:
Microparticles that can circulate in the body hold great potential to diagnose and treat diseases. For such applications, it is important that the injected materials be harmlessly eliminated from the body in a reasonable period of time after they carry out their diagnostic or therapeutic function. However,
there has been little effort to engineer the self-destruction of errant particles into non-toxic, systemically eliminated products. The aim of my research is to develop optically active porous silicon (PSi) microparticles that can simultaneously monitor protease activity in vivo using the intrinsic near-infrared reflectance of the particles and deliver therapeutic agents at the same time. To detect protease activity, the pores of the PSi particles will be filled with an enzyme responsive peptide sequence. The proteases penetrate inside these photonic crystals and cleave this peptide sequence inside the pores. This causes a shift in the wavelength of reflected light that can be read out with an ex vivo detector. Because PSi erodes to benign products in the body, it is an ideal nanomaterial for in vivo applications. The results will demonstrate a new type of multifunctional nanostructure with a non-toxic degradation pathway for in vivo applications. The degradation of the peptide can also be used to release a therapeutic, thus providing a technology that can simultaneously diagnose and treat; with the enzymatic activity controlling the rate of therapeutic release.

**At which upcoming conferences have or are you attending in 2014/2015.**

This year (2014) I presented an oral address at ACNs 5th International NanoMedicine Conference held at our local beach, Coogee Beach. I presented on the topic *Porous Silicon Microsensors for the Detection of Protease Activity In Vivo.*

**How do you spend your spare time?**

According to most of my close friends, I’m a nerd. So to constantly prove them wrong, I tend to do a lot of stuff outside uni. If there is a festival happening in Sydney I’ll be there. Regardless of if it’s Vivid, a fun run or a music festival/concert.

Most of my spare time is spent dancing. I love to dance. I’ll definitely be a dancer in my next life.

**Which profession would you choose if you were not a scientist?**

I come from a family of medical doctors - my mum and dad are both doctors. I’ve been brought up in an environment where discussing patients, diseases, therapy and recovery are regular dinner table conversations. I see my current work as a research scientist as my first career. My second career (if I do get an opportunity) would be more directly medicine based with a desire to be a surgeon.