Research Fellow – Nanoneedle Biosensors

Department/Unit	Drug Delivery Disposition and Dynamics
Faculty/Division	Faculty of Pharmacy and Pharmaceutical Sciences
Classification	Level A
Work location	Parkville campus
Date document created or updated	23 January 2018

Organisational context

Everyone needs a platform to launch a satisfying career. At Monash, we give you the space and support to take your career in all kinds of exciting new directions. You'll have access to quality research, infrastructure and learning facilities, opportunities to collaborate internationally, as well as the grants you'll need to publish your work. We're a university full of energetic and enthusiastic minds, driven to challenge what's expected, expand what we know, and learn from other inspiring, empowering thinkers. Discover more at www.monash.edu

The **Faculty of Pharmacy and Pharmaceutical Sciences** is dynamic, innovative and ambitious, engaging in world-class research and being a leading education provider for over 130 years. We have two key research initiatives: the Monash Institute of Pharmaceutical Sciences and the Centre for Medicine Use and Safety, in which we engage some of the best equipped and most experienced pharmaceutical scientists in Australia. From a teaching perspective, our education curriculum - comprised of undergraduate, postgraduate and higher degrees by research programs - is purpose designed for the study of pharmacy and pharmaceutical science and taught by discipline experts. Our premises are located in 'the Parkville Strip', Australia's premier health & biomedical precinct, and offer world-class teaching facilities and research laboratories to our students and staff. To learn more about the Faculty, please visit our website: www.monash.edu/pharm/.

The **Melbourne Centre for Nanofabrication** (MCN) is a purpose-built facility, designed to fill the gap in Australia for open access, multi-scale fabrication infrastructure, spanning a range of fabrication environments and materials. It provides the means to produce complex micro and nano-science based demonstration devices using an array of tools. The MCN comprises biological and non-biological fabrication techniques; e.g. electron beam lithography, focussed ion beam lithography, photolithography, embossing, deposition (self-assembly) as well as systems integration capabilities; e.g. bonding, biological spotting, microfluidics.

CSIRO Probing Biosystems Future Science Platform. The goal of this FSP is to develop innovative platforms capable of interrogating living systems (e.g. human, animal, plant, synthetic tissue or organoid), preferably in real time, to extract and interpret meaningful information about the health status of the subject, associated with recommendations for treatment and/or automated intervention if required. To help achieve this goal, two target areas of research have been identified: (i) the development of innovative implantable or wearable biosensors for improved health surveillance and (ii) the generation of novel microfluidic organoid-on-a-chip technology to fast track drug and disease biomarker discovery. The advancement in micro-battery design, microelectronics, secure telemetry and improved data analytics are integral to the development of the implantable biosensor platform.

Position purpose

The successful applicant will work on a Monash-CSIRO-joint funded project within the Probing Biosystems Future Science Platform and will be an important member of a multidisciplinary research team in a cutting edge area of cell-materials interaction research. The aim of this project is to apply the nanoneedle array sensor technology towards the detection of markers of tumour recurrence. The need for rapid accurate diagnosis has become a major priority to facilitate more timely and efficacious intervention. Novel approaches are necessary to enable an enhancement on existing diagnosis systems which suffer from poor patient compliance, generate biohazardous waste and often requires expert manipulation by health professionals.

This project aims to develop an immunosensors device based on a porous silicon (pSi) nanoneedles for the detection of tumour recurrence. pSi nanoneedles display great potential as a facile, high-throughput, minimally invasive strategy for transdermal investigation due to their low-cost, versatility and ease of use. The system will be used as painless interface between the patient and a sensing device that enables the minimally invasive harvesting of interstitial fluids through the skin and the subsequent detection of cancer biomarkers by means of electrochemical sensing. Once developed, this nanoneedle platform could be readily integrated in conventional skin patch systems and in commercial wearable devices.

Reporting Line: The position reports to Director of the Melbourne Centre for Nanofabrication, and CSIRO Science Leader

Supervisory responsibilities: Co-supervision of Research Associate, PhD, master and Honours students

Financial delegation and/or budget responsibilities: Not applicable

Key responsibilities

Specific duties required of a Level A research-only academic may include:

1. Design and develop a nanoneedle-based skin biosensor and validate the operation of the device *ex vivo* and *in vivo*
2. The conduct of research under limited supervision either as a member of a team or, where appropriate, independently and the production or contribution to the production of conference and seminar papers and publications from that research
3. Supervision of research-support staff involved in the staff member's research
4. Guidance in the research effort of junior members of research-only Academic staff in her/his research area
5. Contribution to the preparation or, where appropriate, individual preparation of research proposal submissions to external funding bodies
6. Involvement in professional activities including, subject to availability of funds, attendance at conferences and seminars in the field of expertise
7. Administrative functions primarily connected with her/his area of research
8. Occasional contributions to the teaching program within the field of the staff member's research
9. Co-supervision or, where appropriate, supervision of major honors or postgraduate research projects within the field of the staff member's area of research
10. Attendance at meetings associated with research or the work of the organisational unit to which the research is connected and/or at departmental, school and/or faculty meetings and/or membership of a limited number of committees

Key selection criteria

Education/Qualifications

1. The appointee will have:
    - Doctoral qualification in biomedical engineering, bionanotechnology, pharmaceutical sciences, or a related field

Knowledge and Skills

2. Demonstrated competence and experience in nanomaterial fabrication and characterisation
3. Demonstrated competence and experience in characterising and understanding the bio-nano interface
4. Demonstrated competence and experience in in vivo experimentation in mice
5. Additional knowledge in skin science and medical device development is a plus
6. Evidence of an emerging track record of publications and presentations
7. The ability to work under pressure and to prioritise tasks to meet deadlines
8. High levels of initiative and flexibility
9. Well-developed interpersonal and written communication skills
10. Ability to work both independently and collaboratively as a member of a team
11. Ability to work efficiently, meet project timelines, and excellent organisational skills
12. Ability to create and foster links with relevant industry, business and academic partners

Other job related information

- Travel may be required between campuses
- Travel to CSIRO Manufacturing (Clayton) and CSIRO Health & Biosecurity (Brisbane) may be required
- There may be peak periods of work during which the taking of leave may be restricted

Legal compliance

Ensure you are aware of and adhere to legislation and University policy relevant to the duties undertaken, including: Equal Employment Opportunity, supporting equity and fairness; Occupational Health and Safety, supporting a safe workplace; Conflict of Interest (including Conflict of Interest in Research); Paid Outside Work; Privacy; Research Conduct; and Staff/Student Relationships.