**Synthesis and Application of Advanced Fluoropolymers as 19F MRI Contrast Agents**

*Changkui FuA*

AAustralian Institute for Bioengineering and Nanotechnology, The University of Queensland, St Lucia, Queensland, 4072, Australia

**Introduction**

19F magnetic resonance imaging (MRI) is a powerful non-invasive imaging technique that has numerous potential applications in the diagnosis and monitoring of human diseases. Due to the virtual absence of 19F nuclei in the human body, 19F MRI suffers no interference from background signal as often observed in 1H MRI. This allows 19F MRI to generate high contrast images with more precise information and allow for quantitative applications. Therefore, 19F MRI can not only complement the wealth of information provided by 1H MRI, but also opens up a plethora of new applications that 1H MRI cannot achieve. To facilitate 19F MRI, a variety of fluorinated molecules have been developed as imaging agents. Among them, fluorine-containing polymers namely fluoropolymers are particularly attractive as macromolecular imaging agents due to their tuneable size, structure and functionality. However, a significant limitation of current fluoropolymer-based 19F MRI contrast agents is their unsatisfactory imaging sensitivity. The access of highly 19F MRI-sensitive fluoropolymers is limited by the inherent hydrophobicity of fluorine; severe aggregation of fluorine occurs in aqueous solution when fluoropolymers possess a high density of 19F nuclei, resulting in significantly attenuated MR signal and low sensitivity.

In this presentation, I will introduce the design, synthesis and biological applications of new fluoropolymers with high fluorine content and outstanding MRI sensitivity. These fluoropolymers are water soluble homopolymers possessing ~ 25 wt% fluorine. They demonstrated interesting solution property as well as desirable nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI) properties, opening up new possibilities of further in vivo imaging applications using advanced MRI technology.

**Corresponding author**

Changkui Fu Email: changkui.fu@uq.edu.au