



Chemical & Physical Sciences  
UNIVERSITY OF TORONTO  
MISSISSAUGA

## COLLOQUIUM

TUESDAY, FEBRUARY 5<sup>TH</sup>, 2013  
12:00 P.M. (**SHARP**) – 1:00 P.M.  
**IB270**

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## “Gd-Free MRI Contrast Agents”

Magnetic resonance imaging (MRI) is a noninvasive and versatile imaging modality that is increasingly applied in clinical diagnosis and basic biomedical research to obtain anatomic and functional information of living objects. Conventional MRI relies on nuclear magnetic resonance (NMR) signal mainly from the  $^1\text{H}$  nuclei of water, the most abundant molecule *in vivo*. The contrast and sensitivity of MRI can be improved by administration of paramagnetic MRI contrast agent (CA), which can shorten the nuclear spin relaxation time ( $T_1$  or  $T_2$ ) of water protons. The current clinical MRI  $T_1$  CAs are predominantly based on low molecular weight gadolinium (Gd) complexes, which typically exhibit lower relaxivity at higher magnetic fields. Recently, several Gd CAs have been implicated in nephrogenic systemic fibrosis (NSF), a severe side effect found in related to Gd toxicity. Therefore, safer and more efficient MRI CAs are highly desirable.

I will describe our recent efforts on developing Gd-free contrast agents with high sensitivity, low toxicity and optimized pharmacokinetic properties. In addition, new strategies in developing “smart” MRI CAs, which are responsive to certain molecular and cellular events, such as enzyme activity, will also be discussed. These next generation MRI CAs have great potential to be applied to detect diseases at early stage and to monitor the efficacy of treatment with high specificity.