Contribution ID: **480** Type: **Oral (Student, Not in Competition) / Orale (Étudiant(e), pas dans la compétition)**

Multifunctional perfluorocarbon nanoemulsions for cancer therapy and imaging

Monday, 15 June 2015 17:00 (15 minutes)

There is interest for the use of nanoemulsions as therapeutic agents, particularly Perfluorocarbon (PFC) droplets, whose amphiphilic shell protects drugs against physico-chemical and enzymatic degradation. When delivered to their target sites, these PFC droplets can vaporize upon laser excitation, efficiently releasing their drug payload and/or imaging tracers. Due to the optical properties of gold, coupling PFC droplets with gold nanoparticles significantly reduces the energy required for vaporization.
In this work, nanoemulsions with a perfluorohexane core and Zonyl FSP surfactant shell were produced using an oil-in-water technique. Droplets were characterized in terms of size and morphology using high resolution fluorescence techniques (i.e. Total Internal Reflection Fluorescence Microscopy, TIRFM, and Fluorescence Correlation Spectroscopy, FCS), electron microscopy, and light scattering techniques (i.e. Dynamic Light Scattering, DLS). The ability of PFC droplets to vaporize are demonstrated using Optical Microscopy (OM).
Our emulsion synthesis technique has given a reproducible, unimodal size distribution of PFC droplets corresponding to an average hydrodynamic diameter of 53.5 ± 3.8 nm, from DLS and FCS, with long-term stability at physiological conditions. Their size and stability makes them cost effective drug delivery vehicles suitable for efficient internalization within cancer cell lines. To vaporize the nanoemulsions, silica coated gold nanoparticles (scAuNPs) were used and excited with a 532 nm laser. Taken together, TIRFM, dual-colour FCS, and OM show that scAuNPs are within the same diffraction-limited spot of these PFC droplets before vaporization.

Primary author: Mr FERNANDES, Donald A. (Ryerson University)

Co-authors: Dr GRADINARU, Claudiu C. (University of Toronto); Mr FERNANDES, Dennis D. (University of Toronto); Dr ROUSSEAU, Derick (Ryerson University); Dr KOLIOS, Michael C. (Ryerson University); Mrs WANG, Yan (Ryerson University); Mr LI, Yuchong (University of Toronto)

Presenter: Mr FERNANDES, Donald A. (Ryerson University)

Session Classification: M2-6 Radiation Therapy (DMBP-DNP) / Thérapie par rayonnement (DPMB-DPN)

Track Classification: Medical and Biological Physics / Physique médicale et biologique (DMBP-DPMB)