



COLLOQUIUM SEMINAR TALK  
WEDNESDAY, APRIL 4, 2018  
3:10PM  
**KN L 1220**

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### Visualising Chemistry at the Single Molecule Level

My research group exploits fluorescence imaging, in particular single molecule imaging, to study chemical and biological processes at the molecular (or nano-) and cellular levels with unprecedented spatiotemporal resolution and sensitivity. In this presentation, I will illustrate how the merging of advanced fluorescence imaging methodologies combined with the rational design of chemical probes, and photochemical/photophysical<sup>1</sup> schemes enables us to gain a molecular level understanding of chemical processes of fundamental and technological relevance. Specifically, I will present single molecule studies on the assembly, structure, morphology and robustness of DNA nanotubes,<sup>2</sup> emphasizing the key role single molecule fluorescence methodologies do play towards unraveling the structure, resilience, and morphology of supramolecular structures. I will next describe our ongoing work developing and preparing fluorogenic chemoselective probes<sup>3</sup> and utilizing them for reactive oxygen species, and redox species imaging studies. In all cases, emphasis will be placed on the enormous opportunities that single molecule fluorescence provides to interrogate and study chemical reactions of interest.

#### References

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3. Godin, R.; Liu, H.-W.; Cosa, G. *Chem. Sci.* **2014**, *5*, 2525; Greene L.; Godin, R.; Cosa, G.; *J. Am. Chem. Soc.* **2016**, *138*, 11327.; Godin, R.; Cosa, G.; *J. Phys. Chem. C.*, **2016**, *120*, 15349. Greene, L. E.; Lincoln, R.; Cosa, G.; *J. Am. Chem. Soc.*, **2017**, *139*, 15801-15811. Lincoln, R.; Greene, L. E.; Louisa, S.; Cosa, G.; *J. Am. Chem. Soc.*, **2017**, *139*, 16273-16281.



Prof. [Gonzalo Cosa](#) completed his Ph.D. at the University of Ottawa under the direction of Prof. J.C. (Tito) Scaiano. His Ph.D. work in Physical Organic and Photochemistry involved mechanistic studies on drug photodegradation. He was recognized with the Governor General's Gold Medal Award and was a recipient of the 2003 International Union of Pure and Applied Chemistry Award to the Best Ph.D. Thesis in the Chemical Sciences. Following his Ph.D., he joined Prof. Paul F. Barbara's group at the University of Texas at Austin. As a postdoctoral fellow, Prof. Cosa worked on Single Molecule Fluorescence Studies. He obtained the first time-resolved SM-FRET measurements on HIV-1 transactivation response (TAR) DNA hairpins and hairpin mutants complexed with HIV-1 nucleocapsid proteins (NC). In 2005, he joined the Department of Chemistry at McGill University. His current research centers in designing, preparing and utilizing smart fluorescent probes for cell-imaging and on applying state-of-the-art single-molecule fluorescence methodologies to study protein/DNA/lipid interactions.