



Faculty of Applied Science  
CHEMICAL ENGINEERING



***“Accessing New Materials Via Controlled Radical Polymerization: Cases Using Nitroxide Mediators”***

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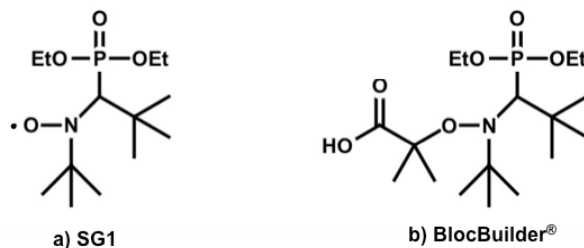
**BIO**

Prof. Marić earned his B.Sc. and B.Eng. & Mgmt. degrees in Chemistry and Chemical Engineering and Management from McMaster University before pursuing a Ph.D. in Chemical Engineering from the University of Minnesota-Twin Cities under the supervision of Chris Macosko. During his Ph.D., he studied the compatibilization of silicone polymers with thermoplastics using pre-made block copolymers and reactive compatibilization. After completing his Ph.D. in 1999, he worked in the scale-up engineering group developing chemical toners at the Xerox Research Center of Canada (XRCC). After 4 years at XRCC, he joined McGill University in 2003 as an Assistant Professor in the Dept. of Chemical Engineering and was promoted in 2009 to the rank of Associate Professor. At McGill, Prof. Marić's research group has mainly focused on the application of controlled radical polymerization, principally nitroxide mediated polymerization, towards developing copolymers for novel membrane materials, tailored macromolecular surfactants and organic electronic materials.



## ABSTRACT

Controlled radical polymerization (CRP) has revolutionized polymer synthesis during the last 15 years as it can control microstructure and attain narrow molecular weight distributions approaching the level achieved by ionic or other so-called “living” polymerizations. However, CRP processes can be done without strictly air-free transfers, rigorously purified reagents and protection of functional groups required by many “living” polymerizations. Other advantages of CRP over ionic polymerization include the ability to link different blocks and/or monomers which otherwise could not be achieved by ionic polymerization and the possibility of controlled polymerization in dispersed aqueous media. Initially, one variant of CRP, nitroxide-mediated polymerization (NMP), was restricted to styrenic monomers using first generation mediators but development of alkoxyamines such as the versatile BlocBuilder® (Arkema) (*Figure 1*) has enabled the polymerization of acrylic and under certain conditions, methacrylic monomers. Examples illustrating the versatility of BlocBuilder will be highlighted such as the development of amphiphilic block copolymers towards tailored macromolecular surfactants and compatibilizers, membrane materials and photovoltaics.



**Figure 1:** Structures of some SG1-based nitroxides used in nitroxide-mediated polymerization (NMP: a) SG1; b) BlocBuilder®.