DESIGN OF RADICAL SENSOR MATERIALS VIA NITRILE IMINE-MEDIATED TETRAZOLE-ENE CYCLOADDITION (NITEC)

*Lederhose, P.*1,2 Barner-Kowollik, C.1,2* Blinco, J.1*  
p.lederhose@qut.edu.au

1Queensland University of Technology, Brisbane, Australia  
2Karlsruhe Institute of Technology, Karlsruhe, Germany

In the concept of profluorescent nitroxides, a molecule involving a nitroxide and a fluorophore, the fluorescence is quenched due to the presence of the unpaired free radical of the nitroxide. However, the fluorescence of the profluorescent compound can be recovered by exposing the species to a reductive environment where the single electron of a nitroxide scavenges another radical species or undergoes a one electron redox reaction.1 The described “switch on/off” fluorescence behaviour of profluorescent compounds can be applied for the synthesis of radical and redox sensors.

The current work introduces a novel synthetic avenue for the preparation of profluorescent nitroxides via nitrile imine-mediated tetrazole-ene cycloaddition (NITEC). Recently, this photo-induced, two step reaction is gaining attention from scientists of all fields of chemistry. Recently, NITEC chemistry has been applied to the fields of protein modification2 and the functionalisation of surfaces.3 The catalyst-free reaction features high reaction rates and full conversion to the desired products.4 Moreover, spatially resolved photo-cycloaddition has been achieved allowing the fabrication of patterned substrates.5 In combination with the profluorescent nitroxide concept, NITEC enables the highly efficient preparation of patterned surfaces functionalized with redox/radical sensitive species. The formed materials can be applied as redox and radical sensors.

References

(1) Blinco, J. P.; Fairfull-Smith, K. E.; Morrow, B. J.; Bottle, S. E. Australian Journal of Chemistry 2011, 64, 373.
(2) de Hoog, H.-P. M.; Nallani, M.; Liedberg, B. Polymer Chemistry 2012, 3, 302.