

## The Investigation of SET Controlled Radical Polymerisation

Anthony J. Grice, Giuseppe Mantovani & David Haddleton\*

\*Department of Chemistry, University of Warwick, Coventry, CV4 7AL, UK.

A new transition metal mediated controlled radical polymerisation mechanism has recently been investigated by Percec et al. that deviates from the standard atom transfer radical polymerisation (ATRP) mechanism. This technique is referred to as single electron transfer living radical polymerisation (SET-LRP)<sup>1</sup>.

SET-LRP relies on the instant disproportionation of the Cu(I)X species yielding Cu(II)X<sub>2</sub> and Cu(0) in the presence of a large selection of nitrogen containing ligands in polar solvents such as water, DMSO, alcohols and ionic liquids. Radicals being generated via a lower activation energy 'outer-sphere' single electron transfer (SET) mechanism leading to an 'ultrafast' LRP able to produce polymers of very high molecular weights at room temperature and below, giving very clean polymers with excellent molecular weight distributions.

This study investigates SET and uses UV-Visible, NMR and EPR spectroscopy techniques to help discover to what extent nitrogen based ligands aid the disproportionation of the Cu(I)X, the crucial step in the above mechanism.

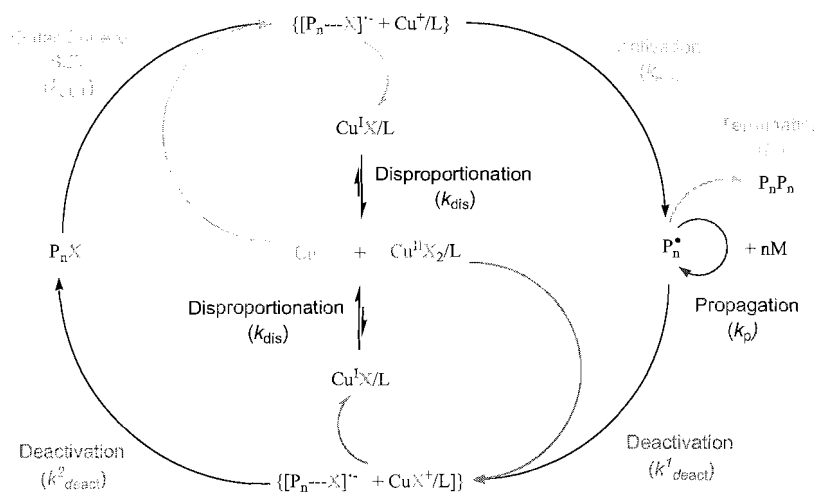


Figure 1 – Proposed mechanism of SET-LRP<sup>2</sup>

### References

- (1) Percec, V.; Guliashvili, T.; Ladislav Janine, S.; Wistrand, A.; Stjerndahl, A.; Sienkowska Monika, J.; Monteiro Michael, J.; Sahoo, S., *J. Am. Chem. Soc.* **2006**, 128, 14156-14165.
- (2) Percec, V.; Guliashvili, T.; *J. Polym. Sci., Part A: Polym. Chem.* **2007**, 45, 1607-1618.