OXYGEN TOLERANT COPPER MEDIATED PHOTO-ATRP UNDER SPECIFIC POLYMERIZATION CONDITIONS

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In recent years, the reduction of the deactivator in atom transfer radical polymerization (ATRP) was reported using various stimuli allowing external control over the activator/deactivator ratio without addition of any additional chemicals.

Here well-defined poly(meth)acrylates were prepared via photochemically induced atom transfer radical polymerization (photoATRP) using ppm amounts of copper catalyst complexes without degassing of polymerization mixture and with no need to introduce an external reducing agent to the system.[1,2] Effect of ligand to $CuBr_2$ ratio on kinetic and induction period during polymerization was investigated. The induction period was influenced also by amount of oxygen in the polymerization system. Light intensity affected both the kinetic of polymerization and the induction period. In addition, the effect of partial replacement of the excess of expensive ligands with cheaper tertiary amines on kinetics of the polymerization was investigated in various solvents. The addition of triethylamine to photoATRP system resulted in both significant shortening the induction period and increasing the polymerization rate.[3,4] High livingness of the oxygen tolerant photoATRP system containing triethylamine was proved by chain-extension polymerizations resulting in formation of block copolymer. The presented photoATRP system was further optimized for flow polymerization and polymerizations under heterogenous conditions and/or in the presence of carbon nanofillers.

Acknowledgements: The authors thank grant agencies for financial support through projects APVV-19-0338, VEGA 2/0129/19. This work was performed during the implementation of the project Building-up Centre for advanced materials application of the Slovak Academy of Sciences, ITMS project code 313021T081 supported by the Integrated Infrastructure Operational Programme funded by the ERDF.

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