MoleculArXiv 2026
Rennes (France), April 29-30, 2026

DIGITAL POLYMER SYNTHESIS USING A FULLY ORTHOGONAL RADICAL PROCESS

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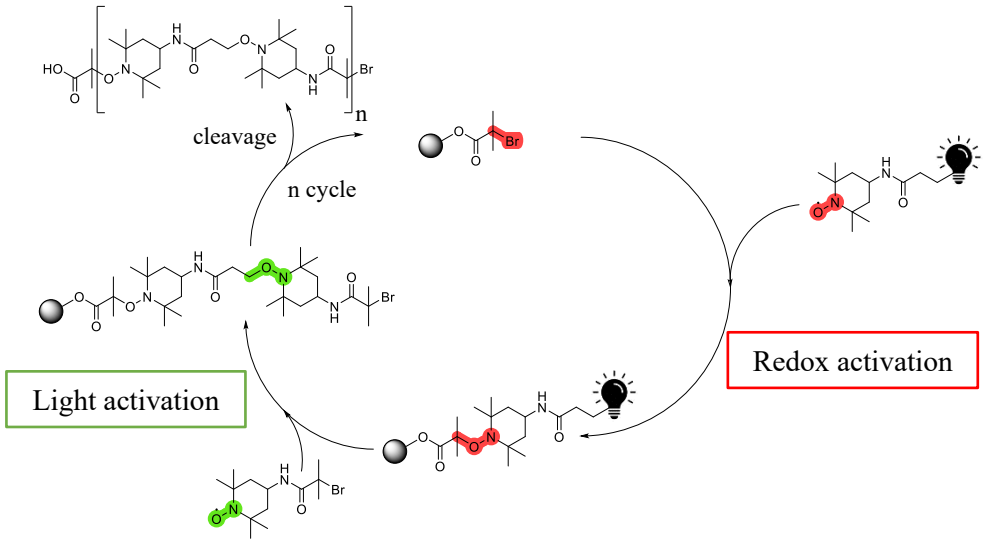
Abstract

We are currently facing a number of global challenges. One of the most important is data storage, which has an important impact on the environment. According to several studies, it is responsible for over 2% of the world's annual energy consumption. This consumption is due to the cooling of spaces dedicated to computer servers. The main problem is that the amount of digital information to be stored increases every year. Over the last ten years, our group has found a way to store information on polymers such as poly(phosphodiester)s[1] or poly(alkoxyamine amide)s[2]. This approach allows data storage at the molecular scale. The problem now, is to achieve big data storage. Therefore, it is crucial to increase the speed of the synthesis. In this context, radical chemistry has been investigated herein. This kind of chemistry is highly reactive and could greatly facilitate synthesis. The polymers are synthetized by stepwise synthesis on a solid support. The building-blocks cointain three parts : (1) a persistent radical such as TEMPO, (2) a linker that is the coding moiety and (3) a radical initiator. To initiate a radical, two orthogonal activations are used. The first is a carbon-bromide bond activation by copper (I) (ATRA) and the second is homolytic bond cleavage by photoactivation[3]. Due to the orthogonality of this method, the polymerization could be controlled by activation/coupling cycles.



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