Atom transfer radical polymerization with protein-conjugated catalysts : easy removal of copper traces and controlled radical polymerizations in protein nanoreactors

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Atom transfer radical polymn. (ATRP) catalysts conjugated to globular, fluorescent, and cage-like proteins are reported. Bovine serum albumin served as functional handle to remove the copper contg. catalyst effectively from soln. Moreover, fluorescent proteins rendered the catalyst traceable by simple fluorescence measurements. The conjugation chem. also allows the attachment of the catalyst to the inside wall of the thermosome, a protein cage from the class of chaperonins, thus confining the polymn. into a nanoscale reaction space in this protein nanoreactor. Such systems allow to drastically reduce the residual copper content in polymers synthesized by ATRP and allow to synthesize well-defined polymers, because conducting ATRP in a nanoreactor enhances the degree of control of aq. ATRP.

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