

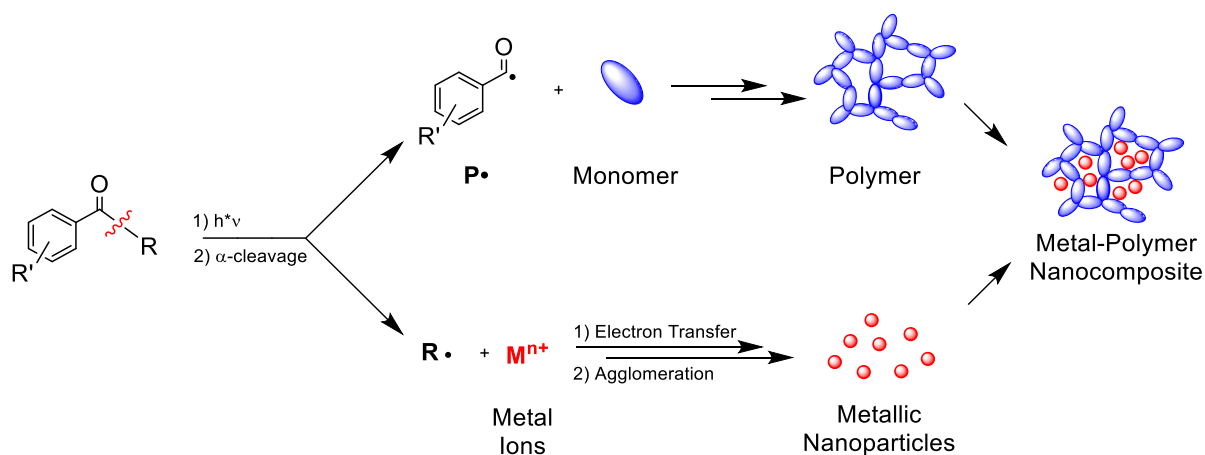
ONE-STEP SYNTHESIS OF METAL-POLYMER NANOCOMPOSITES BY SIMULTANEOUS PHOTOCHEMICAL POLYMERIZATION AND METAL REDUCTION

Max Schmallegger¹, Mathias Wiech¹, Georg Gescheidt¹

¹ Institute of Physical and Theoretical Chemistry, Graz University of Technology, Stremayrgasse 9/I, 8010 Graz, Austria,

The combination of photochemical metal reduction and photo-induced radical polymerization offers a promising route for the rapid and efficient fabrication of metal-polymer nanocomposites. We present an approach wherein the two radicals produced upon the bond cleavage of Norrish Type I photo-initiators simultaneously undergo radical polymerization and metal reduction. This allows the production of well-defined metal-polymer nanocomposites in a one-step synthesis.

We demonstrate how investigating reaction kinetics can elucidate the synergistic interactions between the photochemical and metal-reducing processes.^[1] Additionally, we show how choosing different photo-initiator/monomer/metal combinations can be successfully employed to produce materials with tuneable properties, making them attractive candidates for application in heterogeneous catalysis.^[2]



Scheme 1. Alpha-cleavage of a photoinitiator upon irradiation, yielding a polymerizing radical $P\cdot$ and a reducing radical $R\cdot$, allowing the one-step synthesis of metal polymer nanocomposites

References

- [1] M. Schmallegger, H. Grützmacher, G. Gescheidt, *ChemPhotoChem* **2022**, *6*, e202200155.
- [2] F. Faupel, V. Zaporozhchenko, T. Strunskus, M. Elbahri, *Adv. Eng. Mater.* **2010**, *12*, 1177–1190.