New Catalyst System for High Performance Polymers

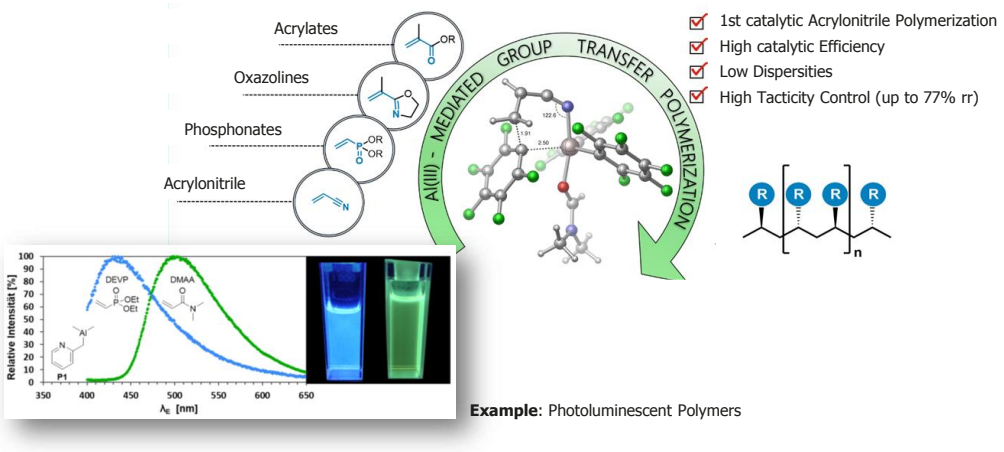
Reference No: B75246, B74151, B76002, B76107, B76177

CHALLENGE

The **polymerization of Michael-type monomers** is a well-known and common technology – however, with several limitations. Radical initiated polymerizations are **difficult to control** with regard to tacticity and dispersity of polymers. Moreover, challenging monomers with bulky substituent groups are **difficult to polymerize** and can currently only be obtained either in **low yields** or with **time and cost consuming processes.** Known methods also often require catalysts based on noble metals or rare earth metals which are **very expensive and detrimental to the environment.**

INNOVATION

The innovation comprises **a new implementation process** for (meth)acrylates and analogous Michael-type monomers (e.g. acrylonitrile, vinylphosphate, vinylpiperidine, lactones, lactides and lactames) to form **high performance polymers.** These premium plastics are important for many sectors of commerce, such as **automotive, pharmaceuticals, cosmetics or functional textiles.**
A **highly effective catalyst** system (TOFs up to 115.000 h^{-1}) is used, which enables to overcome the disadvantages of the conventional free-radical or anionic preparation methods.



Example: Photoluminescent Polymers

COMMERCIAL OPPORTUNITIES

The innovative catalyst system is **based on commercially available main-group element compounds,** thus not requiring the use of toxic and/or expensive subgroup element catalysts. The catalyst system impresses with its **broad range of application.** The innovative syntheses offer **substantial advantages** when compared to conventional processes:

- Fast reaction & maximum efficiency
- Highest precision, simple and controlled reaction guidance
- Cost reduction (cheaper educts and catalysts)
- Synthesis of a wide range of polymers
- Conversion of so far not polymerizable monomers
- First catalytic acrylonitrile polymerization (e.g. for carbon fibers)
- Catalytic "tuning" of polymers (e.g. attaching photoluminescent groups)

DEVELOPMENT STATUS

Established method on a laboratory scale.

REFERENCE:

DOI: 10.1002/chem.201802075
DOI: 10.1021/jacs.6b04129

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Technische Universität München

Technology from
TECHNISCHE UNIVERSITÄT MÜNCHEN

IP rights:
PCT filed in 2017
EP, US, CN pending

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