Catalytic Carbene Insertion Reactions; Creating Diversity in (Material) Synthesis

Fact Sheet

Project Information

CATCIR

Grant agreement ID: 202886

Project closed

Start date
1 August 2008

End date
31 July 2013

Funded under
Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 1 250 000,00

EU contribution
€ 1 250 000,00

Coordinated by
UNIVERSITEIT VAN AMSTERDAM
Netherlands

Objective

With this proposal the PI capitalises on his recent breakthroughs in transition metal catalysed carbene (migratory) insertion reactions to build up a new research line for controlled catalytic preparation of a variety of new functionalised (co)polymers with expected special material properties. Metallo-carbenes are well-known intermediates in olefin cyclopropanation and olefin metathesis, but the PI recently discovered that their chemistry is far richer. He demonstrated for the first time that metallo-

carbenoids can be used in transition metal catalysed insertion polymerisation to arrive at completely new types of stereoregular carbon-chain polymers functionalised at each carbon of the polymer backbone. Rhodium mediated polymerisation of carbenes provides the means to prepare new materials with yet unknown properties. It also provides a valuable alternative to prepare practically identical polymers as in the desirable (but still unachievable) highly stereo-selective (co)polymerisation of functionalised olefins, representing the 'holey-grail' in world-wide TM polymerisation catalysis research. The mechanism and scope of this remarkable new discovery will be investigated and new, improved catalysts will be developed for the preparation of novel materials based on homo- and copolymerisation of a variety of carbene precursors. Copolymerisation of carbenes and other reactive monomers will also be investigated and the properties of all new materials will be investigated. In addition the team will try to uncover new reactions in which carbene insertion reactions play a central role. DFT calculations suggest that the transition state (TS) of the new carbene polymerisation reaction is very similar to the TS's of a variety of carbonyl insertion reactions. Based on this analogy, the team will investigate several new carbene insertion reactions, potentially leading to new, useful polymeric materials and new synthetic routes to prepare small functional organic molecules.

Fields of science (EuroSciVoc)

natural sciences > chemical sciences > inorganic chemistry > **transition metals**

natural sciences > chemical sciences > **polymer sciences**

natural sciences > chemical sciences > **catalysis**

Keywords

Carbene (migratory) Insertion Polymerisation

Carbene-Olefin Copolymerisation

New Catalysis

Programme(s)

FP7-IDEAS-ERC - Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Topic(s)

ERC-SG-PE4 - ERC Starting Grant - Physical and Analytical Chemical sciences

Call for proposal

ERC-2007-StG
See other projects for this call

Funding Scheme

ERC-SG - ERC Starting Grant

Host institution

UNIVERSITEIT VAN AMSTERDAM

EU contribution

€ 1 250 000,00

Total cost

No data

Address

SPUI 21
1012WX Amsterdam
Netherlands

Activity type

Higher or Secondary Education Establishments

Principal investigator

Bastiaan (Bas) De Bruin (Dr.)

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (1)

UNIVERSITEIT VAN AMSTERDAM

Netherlands

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No data

Last update: 16 July 2019

Permalink: https://cordis.europa.eu/project/id/202886