



Chemical Sciences

# Chemical Conversion

**Grants Overview 2010 - 2016**  
**Annex to Factsheet**

Reference date: August 2016

## Spinoza Prize Winners

1997 Prof. R.A. van Santen (Eindhoven University of Technology) – Inorganic Chemistry and Catalysis

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2004 Prof. B.L. Feringa (University of Groningen) – Synthetic Organic Chemistry

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2009 Prof. A. van den Berg (Twente University) – Nanotechnology-miniaturization in physics, chemistry, biology and biotechnology

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2013 Prof. B.M. Weckhuysen (Utrecht University) – Inorganic Chemistry and Catalysis

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2014 Prof. M.C.M. van Loosdrecht (Delft University of Technology) – Environmental Biotechnology

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## Grants Talent Scheme

### 2010

Veni		
Dr. P.C.A. Bruijninx	Building the Renewable Lignin Platform: New Heterogeneous Catalyst Technology for the Production of Chemicals and Fuels from Biomass	UU-BWSK
Dr. A. van Houselt	A tunnel vision on heterogeneous catalysis in water	UT-TNW
Dr. P.B. Rodríguez Pérez	Elucidating the catalytic properties of gold by electrochemistry	UB-BIRM
Dr. A.K.H. Hirsch	Add and Mix: Bioconjugates to Solubilise Inhibitors	RUG-STRAT

### 2011

Veni		
Dr. D. Millo	In situ spectroelectrochemistry of outer membrane cytochromes embedded in living microorganisms grown on electrodes	VU-EW
Dr. E. Otten	Direct Activation of Oxygen by Early Transition Metal Complexes: From Fundamental Science to Application in Oxidation Catalysis	RUG-STRAT

Vidi		
Dr. S.R. Harutyunyan	New concepts in sustainable catalytic asymmetric carbon-carbon bond formation	RUG-STRAT
Dr. A.M. Beale	Towards a deeper understanding of catalytic activity in supported precious metal catalysts	UU-DINS
Dr. S.A. Bonnet	Light-activatable ruthenium-based anticancer drugs	UL-LIC

Vici		
Prof. dr. B. de Bruin	Radicals in Catalysis; Selective Metal-Mediated Radical-Type Transformations	UvA-HIMS

### 2012

Veni		
Dr. ir. J. Ruiz Martinez	Conversion of Oxygenates into Chemicals with Brønsted- and Lewis-based Zeolites: in-situ Spectroscopy Will Reveal Who Did It	UU-BWSK

Vidi		
Dr. J.C. Slootweg	Can main-group elements do the job of transition metals?	VU-EWSF
Dr. R.E. Bulo	Multi-scale Modeling Approach to Biomass Valorization: Solvent Effects	UU-BWSK
Prof. dr. J. Gascon	MetMOFCat: Towards Mild Methane Oxidation MOF catalysts	TUD-TNWCE
Dr. R. Eelkema	Turn on, turn off: using catalysis to control material structuring, dynamics and response	TUD-TNWCE

Vici		
Prof. dr. P.E. de Jongh	Stability of Supported Nanoparticles for Sustainable Catalysis	UU-BWSK

## 2013

Veni		
Dr. W.I. Dzik	Bimetallic catalysts for direct formation of amines from N <sub>2</sub>	UvA-HIMS
Dr. T.J. Boltje	New methods to prepare glycosidic bonds: enabling the synthesis of 'sweet' vaccines	RU-IMM
Dr. W.A. Smith	Solar Fuel Generation via Photoelectrochemical Water Splitting over Copper Based Photoelectrodes	TUD-TNWCE

Vidi		
Dr. P.C.A. Bruijninx	Bio-Inspired Heterogeneous Catalysts for Biomass Conversion Processes	UU-BWSK
Dr. M. A. Fernández	New strategies to sustainable procedures based on metal-catalyzed C-H functionalization	UVA-HIMS

Vici		
Prof. dr. J.G. Roelfes	Artificial Metalloenzymes: augmenting biological synthesis with chemical versatility	RUG-STRAT

## 2014

Veni		
Dr. W. Dong	Quantum-State Resolved Reactive Scattering of Velocity-Controlled OH with O radicals	SU-SAND
Dr. F. Calle Vallejo	Towards a comprehensive and predictive theory of catalysis based on simple structure-activity relations	UL-LIC

Vidi		
Prof. Dr. M. Tromp	Camera ready? Action!	UVA
Dr. J. Meyer	Chemical reactions: hot or not?	LEI

Vici		
Dr. F. Hollmann	BioAqua: Water as cosubstrate for biocatalytic redox reactions	TUD

## 2015

Veni		
Dr. G.T. Whiting	Taking a shine to industrial catalysts	UU
Dr. J. Zecevic	Design of Bio-active Supramolecular Polymers	UU
Dr. C.E. Paul	Enhancing Nature's catalysts: new vitamins for enzymes	TUD

Vidi		
Dr. K. Barta	New concepts in catalytic lignin depolymerization: sustainable pathways towards value added chemicals	RUG
Dr. T.J. Mooibroek	Supramolecular catalysts for the one-pot selective synthesis of carbohydrate derivatives	UVA
Dr. F. Meirer	3D spectro-microscopy for understanding mass transport processes in catalyst bodies of complex porosity	UU

Vici		
Prof. dr. ir. T.J.H. Vlugt	Understanding structural heterogeneities in Deep Eutectic Solvents and Ionic Liquids	TUD
Prof. dr. ir. R.G.H. Lammertink	Mixing at the boundary	UT

## 2016

Veni		
Dr. G. Li	Towards efficient methane dehydroaromatization catalysts: a computational approach	TUD
Dr. T.J. Korstanje	Homogeneous catalysts for the production of BTX from lignin	UVA

## Grants TOP, TOP-PUNT and ECHO

### 2010 - 2011

TOP		
Prof. dr. ir. B.M. Weckhuysen	In-Situ Spectroscopy of a Single Catalyst Particle: New Insights in Zeolite-based Bifunctional Catalysis	UU-BWSK
Prof. dr. M.T.M. Koper	Solvent effects in the electrocatalytic reactions of water	UL-LIC

ECHO		
Prof. dr. G.A. van der Marel	Automated solid phase synthesis of teichoic acids	UL-LIC
Dr. D.V. Filippov	Synthetic methodology for well-defined ADP-ribosylated biomolecules	UL-LIC
Prof. dr. ir. A.J. Minnaard	Synthesis of Crenarchaeol, the Most Abundant Organic Compound on Earth	RUG-STRAT
Dr. ir. A.R.A. Palmans	Catalytically active synthetic polymers in water by compartmentalization through folding	TUE-ST
Dr. F. Buda	Bio-inspired molecular rectifier for artificial photosynthesis	UL-LIC
Dr. C. Müller	Novel Functional Molecular Materials Based on Phosphorus	TUE-ST

### 2011 - 2012

TOP		
Prof. dr. K. Lammertsma	Organophosphorus Chemistry - Novel Approaches to Advance and Preserve	VU-EWSF

ECHO		
Prof. dr. ir. M.W. Fraaije	Electrochemically-assisted redox enzyme reactors by cofactor immobilization	RUG-WN
Dr. J.H. van Maarseveen	A scaffold-directed clipping approach towards the lasso peptide series	UvA-HIMS
Dr. J. Matysik	Field-cycling photo-CIDNP MAS NMR	UL-LIC
Prof. dr. ir. J.A.M. Kuipers	Multiscale modeling of gas-solid mass transfer and its impact on riser reactor performance	TUE-ST
Prof. dr. B.L. Feringa	Multitasking in asymmetric catalysis	RUG-STRAT
Prof. dr. ir. M.C. Kroon	Azeotrope-breaking using novel nature-based deep eutectic solvents	TUE-ST

### 2012 - 2013

TOP		
Prof. dr. E.J.M. Hensen	Nanoparticles Caught in the Catalytic Act by In-situ Diffraction: Towards Understanding Structure Sensitivity	TUE

ECHO		
Prof. dr. G.A. van der Marel	Synthesis of glycopeptides and phosphoglycopeptides to characterize and detect posttranslational modifications of <i>Neisseria pili</i>	UL
Prof. dr. V. Hessel	Breaking the unbreakable: C-H carbonylation in micro flow and vision to process	TUE
Prof. dr. R.J.M. Klein Gebbink	Fe-catalyzed direct arylation of Ar-H bonds: from mechanistic understanding to catalyst development	UU
Dr. R.A.H. Engeln	A novel approach to renewable energy storage through plasma-assisted CO <sub>2</sub> -to-CO reduction	TUE
Prof. dr. ir. M. van Sint Annaland	Unravelling the origin of the redox kinetics behaviour of oxygen carriers in chemical looping combustion	TUE

## 2013 - 2014

TOP		
Prof. dr. ir. R.V.A. Orru	One-pot Cascade Syntheses using Multicomponent Reactions and Biocatalysis	VU-EWSF
Prof. dr. ir. A.J. Minnaard	Palladium Catalysis enabling Chemical Biology	RUG-STRAT
Prof. dr. ir. J.A.M. Kuipers	First-principles based multi-scale modelling of transport in reactive three-phase flows	TUE-ST

ECHO		
Dr. J.H. van Maarseveen	Cu-promoted Epimerization-free C-terminal Peptide Elongation	UvA-HIMS
Dr. S.R. Harutyunyan	Catalytic asymmetric methods for synthesis of diary alcohols, diarylamines and aminoesters with quaternary stereocenters	RUG-STRAT
Prof. dr. S.R.A. Kersten	Thermochemical production of chemicals and fuels from lignocelluloses; Pyrolysing demineralized biomass	UT-TNW
Dr. A. Schallmey	Degradative enzymes in a synthetic context: Etherase-catalysis for the sustainable synthesis of enantiomerically pure beta-ketoethers and beta-ketosulfides	UVA-HIMS
Dr. D.G.H. Hetterscheid	Cytochrome C Oxidase mimics for use in catalytic water oxidation	UL-LIC
Dr. M.E. Moret	A bifunctional approach to the hydrogenation of CO <sub>2</sub> -derived substrates catalysed by earth-abundant metals	UU-BWSK

## 2015

TOP		
Prof. dr. B. de Bruin	Hypovalency in Catalysis; Towards Sustainable C-H Bond Functionalization & Carbene Polymerisation	UVA

TOP-PUNT		
Prof. dr. G. Rothenberg	Catalysis in confined spaces	UVA

ECHO		
Prof. dr. ir. H.J. Bouwmeester	Fat microreactors	WUR
Dr. S.R. Harutyunyan	One-pot alkylation/aza-Brook-rearrangement/carbanion trapping strategy for catalytic asymmetric synthesis of chiral C-tertiary amines	RUG
Prof. dr. G.J. Poelarends	M - Exploiting enzyme promiscuity for biocatalysis: Engineering novel Michaelases for carbon-carbon bond formation	RUG

Reference date: 1 September 2016. The 2016 round TOPIECHO based on continuous applications.

## Advanced Research Center (ARC)

### Advanced Research Center for Chemical Building Blocks (ARC CBBC)

Participants: Dutch universities and research institutes  
 Founders: RUG, UU, TU/e (research hubs), AkzoNobel, Shell, BASF, NWO, Ministry of Economic Affairs, Topsector Chemistry

## Grants International Thematic Programmes

### 2009

EraNET: Industrial Biotechnology (ERA-IB)		
Prof. J.D. van Elsas	Targeting population heterogeneity at microscale for robust fermentation processes	RUG
Dr. L. de Graaff	Novel enzyme tools for production of functional oleochemicals from unsaturated lipids	WUR
Dr. E. Vijgenboom, Prof. G. van Wezel	Enzyme Production in Optimized Streptomyces	LU
Dr.ir. A.J.J. Straathof	Bio-based production of chemical building blocks: Corynebacterium glutamicum as a platform for new and efficient bioprocesses	TUD

### 2010

EraNET: Industrial Biotechnology (ERA-IB)		
Prof.dr. J.H. de Winde	Pseudomonas 2.0: industrial biocatalysis using living cells	TUD/UL
Prof.dr. V. Hessel	Combining efforts in enzyme and process engineering to improve access to multifunctional chiral intermediates	TUe
Dr.ir. A.J.A. van Maris	Integral Engineering of Acetic Acid Tolerance in Yeast	TUD
Prof.dr. W.J.H. van Berkel	Multi enzyme systems involved in astin biosynthesis and their use in heterologous astin production	WUR

### 2011

Cooperation Brazilië (FAPESP) - Biobased Economy		
Prof. dr. A.P.C. Faaij	Sustainable development potentials and pathways for biobased economy options: an integrated approach on land use, energy system and economy and environment	RUG-WN
Dr. ir. G.F. Wiegertjes	Use of branched 1,3/1,6 beta glucan, MacroGard®, a waste product of the production of sugar and ethanol from baker's yeast, to stimulate the innate immune system of farmed fish	WUR-DW
Dr. E.E. Kuramae	Microbial networks in control of greenhouse gases emissions in Bio-based agriculture - MiniBag	KNAW-NIOO
Prof. dr. L.E.M. Vet	Recovering nutrients and carbon from concentrated black water	KNAW-NIOO
Dr. D.-J. Scheffers	New environmental-friendly compounds to combat citrus canker	RUG-WN
Prof. dr. J. Falcão Salles	Microbial Consortia for Biowaste Management - Life cycle analysis of novel strategies of bioconversion (MICROWASTE)	RUG-CEES
Dr. W.M. van Gulik	Programmable balancing of growth and formation of polyhydroxyalkanoates in Escherichia coli	TUD-TNWBT

Cooperation Brazilië (CNPq) - Biobased Economy		
Dr. ir. R.J.M. Kormelink	Towards broad, stable and durable resistance against Tospoviruses and Begomoviruses in Solanum Lycopersicon	WUR-PW
Prof. dr. G.A. Kolb	Development of Innovative Catalysts for Syngas Adjustment and Fischer-Tropsch Synthesis from Biomass for Integrated and Decentralised Production of Renewable Synthetic Fuels - DICAFIR	TUE-ST
Prof. dr. ir. H.J. Bouwmeester	Sustainable bisabolol production from renewable resources	WUR-PW
Prof. dr. ir. A.Y. Hoekstra	Agricultural resource efficiency and reduction of impacts under land-use and climate change scenarios in Brazil	UT-CTW
Dr. ir. H.W.M. Hilhorst	Genetic and molecular basis of chlorophyll retention in soybean seed	WUR-PW
Dr. E.E. Kuramae	Harnessing the rhizosphere microbiome to enhance plant productivity	KNAW-NIOO



## 2014

EraNET: Industrial Biotechnology (ERA-IB)		
Dr. E. Vijgenboom	Novel approaches to develop filamentous micro-organisms for enzyme production	LU
Prof.dr. B. Teusink, Dr. P. Daran-Lapujade	Mastering the economics of adaptation through constraint-based modeling in yeast	VU, TUD
Prof. K. Loos	Optimized laccase systems for high-value bio-plastics production from biomass	RUG
Dr. A. Wahl	DYNAMICS: Analysis and optimization of industrial microorganisms under dynamic process conditions	TUD

## 2015

EraNET: Industrial Biotechnology (ERA-IB)		
Prof.dr. H.J. Bouwmeester	Biotechnological Production of Monoterpenoids	WUR
Dr. A.F.J. Ram	Fungal Chitosans from Fermentation Mycelia for Plant Biostimulants	LU
Dr. W.M. van Gulik	Tailoring thermotolerant yeasts for more sustainable, eco-efficient and competitive industrial fermentations	TUD
Prof.dr. U. Hanefeld	Enzymatic sugar coupling	TUD

## Gravitation Programme

### 2012

#### Netherlands Center for Multiscale Catalytic Energy Conversion

Prof. dr. ir. B.M. Weckhuysen (UU), prof. dr. ir. A. van den Berg (UT), prof. dr. A. van Blaaderen (UU),  
prof. dr. ir. J.A.M. Kuipers (TUE), prof. dr. D. Lohse (UT), prof. dr. R.A. van Santen (TUE)

#### The Soehngen Institute for anaerobic microbiology: microben voor gezondheid en milieu

Prof. dr. ir. M.S.M. Jetten (RU), prof. dr. ir. M.C.M. van Loosdrecht (TUD), prof. dr. ir. A.J.M. Stams (WUR),  
prof. dr. ir. J.S. Sinninghe Damsté (NIOZ), prof. dr. W.M. de Vos (WUR)

## Grants Public-Private Cooperation

CHIPP		
Prof. dr. ir. K.P. de Jong	Structure-Stability Relationships for Supported Catalysts	UU
Private partner: Shell		
Prof. dr. ir. E.J.M. Hensen	Structure sensitivity of supported nickel catalysts for (de)hydrogenation of alkanes and alkenes	TUE
Private partner: BASF		
Prof. dr. ir. E.J.M. Hensen	A holistic catalysis and reaction engineering approach to methane dehydroaromatization into chemicals	TUE
Private partner: Sabic		
Prof. dr. ir. L. Lefferts	Non-oxidative Coupling of Methane via Plasma Catalysis	UT
Private partner: SASOL		
Prof. dr. ir. M.C.M. van de Sanden	syncat@DIFFER: Electricity to Chemistry, Catalysis for Energy Storage	FOM/DIFFER
Private partner: Syngaschem		
TA		
Prof. dr. D. Lohse	Unravelling the mystery of solar steam nanobubbles	UT
Private partners: TNO, BASF, Albemarle		
Prof. dr. ir. B.M. Weckhuysen	Multi-scale Chemical Imaging of Multi-component Catalyst Materials: New Opportunities to Understand Catalytic Activity and Related Deactivation Phenomena of Ziegler-Natta Catalysts	UU
Private partners: DSM Resolve, Sabic		
Prof. dr. M.T.M. Koper	Electrochemical, catalytic and process engineering aspects of gas-forming electrolysis	UL
Private partners: Akzo Nobel Industrial Chemicals, Magneto Chemie, Elson Technologies, Shell Global Solutions International		
Prof. dr. ir. M.W. Fraaije	Discovery and evaluation of novel oxidases for biorefinery applications	RUG
Private partners: AVEBE UA, Dyadic Nederland		
Prof. dr. ir. B.M. Weckhuysen	A hybrid route for the production of aromatic acids via the catalytic tandem Diels-Alder aromatization of furans	UU
Private partners: Norit, Avantium Technologies		
Dr. C.G. Boeriu	Efficient chemo-enzymatic routes for the production of high-value chemicals and materials from chitin	WUR
Private partner: Dyadic Nederland		
Prof. dr. ir. H. Gruppen	Cracking the recalcitrance of xylan in hard-to-convert biomass with novel enzymes and intrinsic chemical catalysts	WUR
Private partners: C4C Holding, DSM Food Specialties		
Dr. ir. A.J.J. Straathof	Methyl esters from biomass	TUD
Private partners: Lucite International UK Ltd., DSM Gist Services		
Prof. dr. ir. P.J. Schoenmakers	HYPERformance Liquid Chromatography	UvA
Private partners: Akzo Nobel Chemicals, Avantor Performance Materials, RIKILT - Institute of Food Safety, Shell Global Solutions International, Syngenta, Dionex Benelux, DSM R&D Solutions		
Prof. dr. ir. P.J. Schoenmakers	MANIAC - Making Analytically Incompatible Approaches Compatible	UvA
Private partners: DSM Coating Resins, Micronit Microfluidics, Heineken Supply Chain, Shell Research and Technology Centre		
Prof. dr. A.P.M. Kentgens	Hyphenation of supercritical fluid chromatography and nuclear magnetic resonance spectroscopy	RU
Private partners: Waters Chromatography, Shell Global Solutions International		
Prof. dr. F. Kapteijn	Towards Selective and Stable Methanol to Olefins Conversion: Alternative Route to C2-C4 Olefins with Zeolite Materials	TUD
Private partners: BASF Nederland, DSM Resolve		

Prof. dr. ir. K.P. de Jong	Lower Olefins from Synthesis Gas Using Supported Iron Catalysts Coping with the challenges of selectivity and stability	UU
Private partners: Dow Benelux, Johnson Matthey Catalysts		
Prof. dr. ir. B.M. Weckhuysen	Towards More Energy-Efficient Manufacturing Processes of Propylene-boosting Fluid Catalytic Cracking Catalysts	UU
Private partners: Albemarle Catalysts Company, VibSpec-Training, DSM Resolve		
Dr. I.M.N. Groot	Promoter and poison effects in heterogeneous catalysis: Novel tools to shed fundamental insight	UL
Private partners: Shell Global Solutions en Leiden Probe Microscopy, Royal DSM		

#### Programmatic TA (PTA) CatC1Chem

Private partners: BASF, SASOL, SABIC

Prof. dr. ir. L. Lefferts	Catalytic pyrolysis of methane to ethylene and aromatics	UT
Prof. dr. J. Gascon	Metal Organic Framework catalysts for the gas phase direct synthesis of Methanol from Methane	TUD
Prof. dr. G. Mul	Photography inspired activation of natural gas	UT
Dr. I.M.N. Groot	Bridging the pressure and materials gaps in methanol steam reforming	UL

#### Programmatic TA (PTA) ISPT

Private partner: Institute for Sustainable Process Technology

Prof. dr. ir. M.T. Kreutzer	Collapsing films in emulsions: what a little wave can do!	TUD
Prof. dr. R.F. Mudde	A DNS approach to Emulsions: Mobile Interfaces and Adsorbed Surfaces	TUD
Prof. dr. ir. N.E. Benes	Hypercrosslinked nanoscale-hybrid membranes for solvent nanofiltration	UT
Dr. A.J.A. Winnubst	Modular functionalized ceramic nanofiltration membranes	UT

#### LIFT

Prof. dr. J.N.H. Reek	DIMPHos based transition metal catalysis for selective synthesis	UvA
Private partner: InCatT		
Prof. dr. J.H. van Maarseveen	Transition-metal catalyzed epimerization-free peptide C-terminal activation and fragment coupling	UvA
Private partner: Enzyep		
Prof. dr. M. Tromp	Preparation of Complex Oxide Systems ? Understanding and Designing Catalysts	UVA/HIMS
Private partner: Clariant Produkte (Deutschland) GmbH		
Prof. dr. ir. M.W. Fraaije	Towards green indigo blue	RUG
Private partner: TEKSTIL		
Dr. M. A. Fernández Ibanez	Sustainable synthesis of biaryl compounds via aerobic cross-dehydrogenative coupling	UVA/HIMS
Private partner: DSM		
Dr. R. de Gelder	Crystal-free Crystallography for Impurity Profiling in Chemical Industry	RU
Private partner: DSM		
Prof. dr. L.W. Jenneskens	Sustainable mesoporous ferromagnetic graphitic carbon bodies with iron nanoparticles for water remediation	UU
Private partner: BASF		
Prof. dr. E.J.M. Hensen	Application of advanced combined in-situ Mössbauer/IR/GC characterisation under industrially relevant conditions to underpin and accelerate development of improved Fe-based catalysts	TUE
Private partner: Johnson Matthey Technology Centre		
Prof. dr. ir. H.J. Heeres	Bio-p-terephthalic acid (Bio-PTA) from glycerol	RUG
Private partner: BioBTX		

KIEM		
Prof. dr. F. Picchioni	Groene biobased bouwstenen: Synthese van 2,5-Furandicarboxylic acid (FDCA) uit goed toegankelijke aldaric acids	RUG
Private partner: Syncom		
Prof. dr. H. Ovaa	Large scale lysine chlorination	NKI
Private partner: Merchachem		
Prof. dr. G.J. Poelarends	Groene productie van complexe aminozuren: Enzymatische synthese van 3-aryl en 3-aryloxy gesubstitueerde aspartaat derivaten uit goed toegankelijke fumaarzuren	RUG
Private partner: Integrex Research		
Prof. dr. ir. M.C. Kroon	Feasibility of orange peel extraction using natural Low Transition Temperature Mixtures	TUE
Private partner: ETD&C		
Prof. dr. F.P.J.T. Rutjes	High pressure-driven synthesis of new lead compounds for antibiotics	RU
Private partner: Pansynt		
Prof. dr. F.P.J.T. Rutjes	Accelerating preclinical development of a novel antimalarial by scaling up the synthesis of an innovative inverse pantothenamide	RU
Private partner: TropIQ Health Sciences		
Dr. J. Mecinovic	Synthesis of dimethyllysine analogues and their application in epigenetics	RU
Private partner: Chiralix		
Prof. dr. G. Mul	Fotokatalytisch actieve plafondplaten	UT
Private partner: Exterior Coatings		

## Thematic Grants (Public-Private Cooperation)

Solar to Products		
Prof. dr. G. Mul	Photo Thermocatalytic conversion of CO <sub>2</sub> and H <sub>2</sub> O to methanol	UT
Private partner: Abengoa Research, S.L.		
Prof. dr. ir. G. van Rooij	CO <sub>2</sub> valorisation in biogas by Solar driven Plasma Reforming	DIFFER
Private partner: Shell Global Solutions International		
Dr. W.A. Smith	An integrated device to directly convert sunlight, water, and CO <sub>2</sub> to syngas using only earth abundant materials	TUD
Private partner: Shell Global Solutions International		
Prof. dr. J.N.H. Reek	Redox Mediators in Dye-sensitized Photoelectrochemical Cells for CO <sub>2</sub> -reduction	UVA
Private partner: Merck KGaA		
Dr. F. Branco dos Santos	Darwin's path towards sustainability: Exploring evolutionarily stable strategies in engineered biosolar cell factories	UVA
Private partner: Photanol		
Prof. dr. ir. M.C.M. van de Sanden	Vibrationally stimulated electro-fuel production in a proton conducting solid oxide electrolysis cell	DIFFER
Private partner: Shell Global Solutions International		
Dr. F. Buda	Design and optimization of a photoanode for solar fuel production	UL
Private partner: Scientific Computing & Modelling		
Prof. dr. G. Mul	Electrochemical reduction of CO <sub>2</sub> to ethylene	UT
Private partners: TNO Technical Sciences, Shell Global Solutions International		