DECHEMA
Gesellschaft für Chemische Technik
und Biotechnologie e.V.

PROGRAMME

23 – 27 June 2019 · Aachen · Germany

ICCDU 2019
17th International Conference on Carbon Dioxide Utilization

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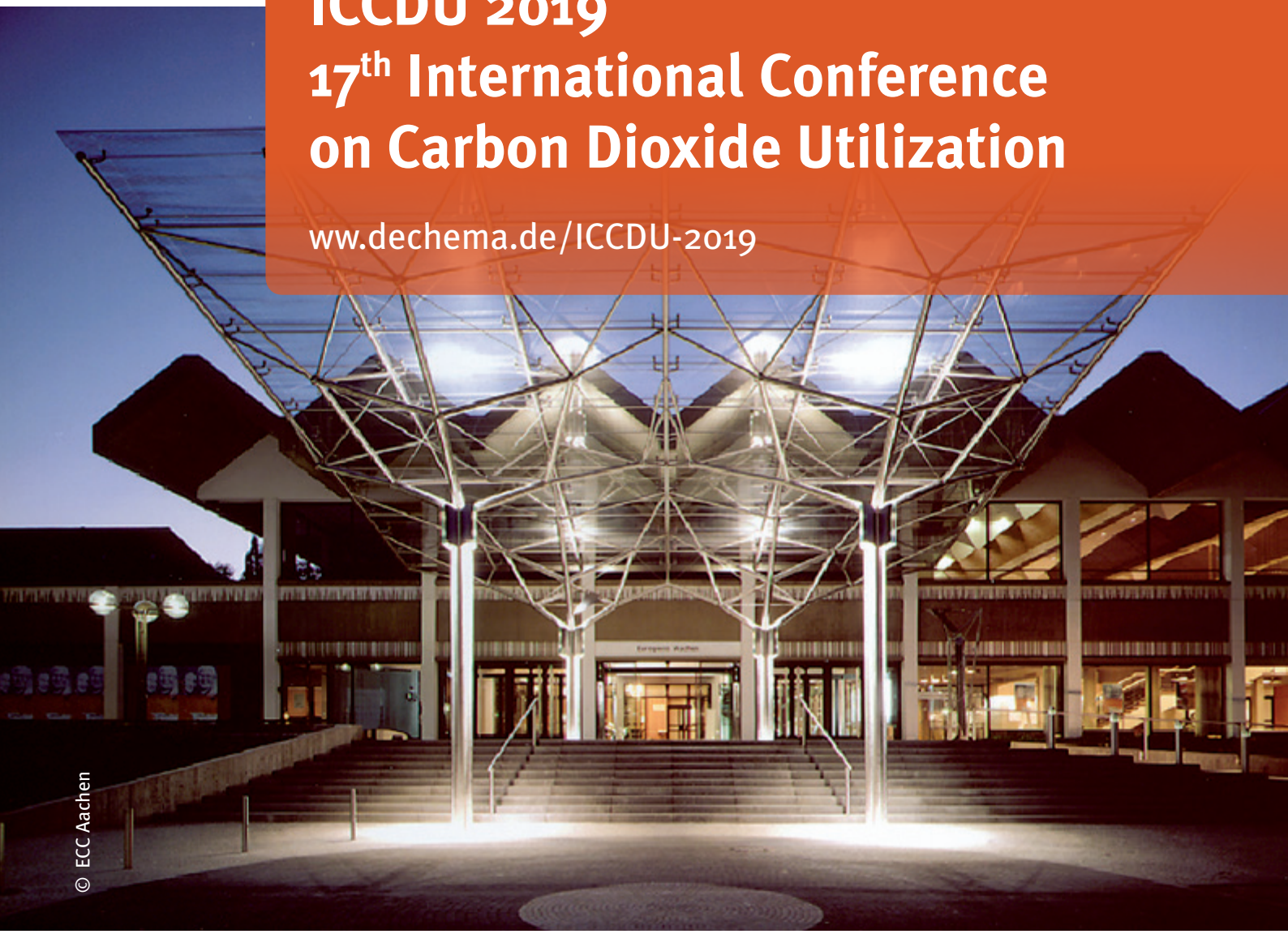

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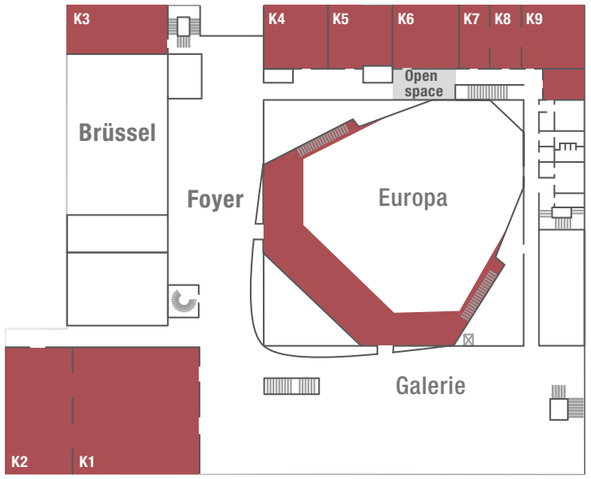
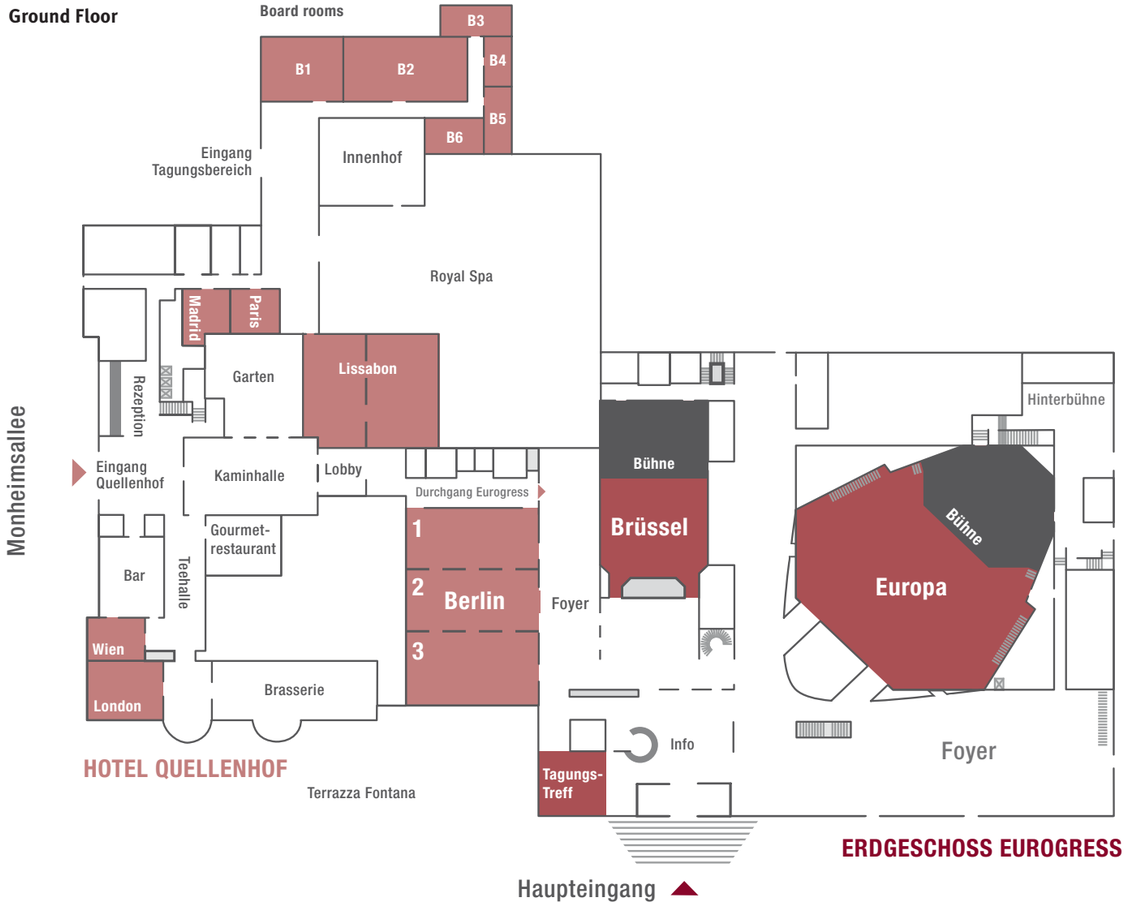
VENUE

1st Floor



OBERGESCHOSS EUROGRESS

Ground Floor



HOTEL QUELLENHOF

ERDGESCHOSS EUROGRESS

PROGRAMM AT A GLANCE

Sunday, 23 June 2019

	Brüssel
16:00	**Registration**
17:30	**WELCOME** W. Leitner, RWTH Aachen/D C. Gürtler, Covestro AG, Leverkusen/D
17:40	**WELCOME LECTURE** A. Quadrelli, CPE Lyon/FR
18:10	**GET TOGETHER** (18:10 – 19:30)

Monday, 24 June 2019

	Brüssel
	OPENING CEROMONY
09:30	**OPENING** W. Leitner, RWTH Aachen/D; C. Gürtler, Covestro AG, Leverkusen/D **WELCOME** Prof. M. Wessling, RWTH Aachen/D
10:00	Honorary Chairman Prof. Dinjus
10:15	PLENARY LECTURE R. Schlögl, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin/D
11:00	Coffee break

	Brüssel	K2	K3	K4
	Kopernikus P2X Day	**CO_2-capture and separation** Materials for Capture Processes	**CO_2 to carbonate** Industry-perspective on carbonation	**CO_2 to chemicals** CO_2 to Hydrocarbons
Chair:	*G. Schmid*	*H. Yamada*	*P. Knops*	*T. Schaub*
11:30	R.-A. Eichel	Q.Wang	J. Theulen	P. Gao
11:50	J. Baumgartner	H. Li		S. -M. Hwang
12:10	L. Schulz	S. Chen	P. Carey	X. Guo
12:30	Lunch break			
	Kopernikus P2X Day	**CO_2-capture and separation** CO_2-adsorption	**CO_2 to carbonate** Carbonation of concrete / recycled aggregates	**CO_2 to chemicals** CO_2 to Hydrocarbons
Chair:	*R. Dittmeyer*	*S. Chen*	*C. Mota*	*C. Song*
14:00	G. Schmid	C. Bajamundi	C. Shi	J. Zhu
14:20		J. Schäffer	I. Amr	
14:40	A. Lüken	A. Kretzschmar	J. an Skocek	P. Behr
15:00	Coffee break			
	Kopernikus P2X Day	**CO_2-capture and separation** Amine based CO_2 capture	**Electro- and Photocatalysis**	**CO_2 to chemicals** CO_2 to Hydrocarbons
Chair:	*R.-A. Eichel*	*P. Behr*	*A. Krüge*	*n.n.*
15:30	S. Pischinger	H. Yamada	J. Xuan	N. Engelbrecht
15:50	R. Dittmeyer	F. Lou	G. P. A. Gobaille-Shaw	L. He
16:10	P. Wasserscheid	S. Chen	S. Gavrielides	Z. Stadler
16:30	**POSTERPARTY**			
18:00	End of Conference Day			

PROGRAMME AT A GLANCE

Tuesday, 25 June 2019

	Brüssel			
08:30	PLENARY LECTURE P. Dröll, European Commission, Research and Innovation, Brussels/BE			
	Brüssel	K2	K3	K4
	Policy Session CO_2 Forum	**CO_2 to carbonates** Carbonation of industrial (by)products and wastes	**CO_2 to chemicals** CO_2 to Oxygenates	
Chair:	*A. Quadrelli*	*P. Carey*	*M. North*	
09:15	Introduction A. Quadrelli			
09:20	n.n	L. Esquivias	E. Gyenge	
09:40	F. Ramos	K. Han	K.Parkhomenko	
10:00	A. Bazzanella/F. Ausfelder	P. Knops	P. Vidinha	
10:20	**Panel discussion:** Policy persectives	A. V.M. Nunes	J. D. Rozendo	
10:40		L. Esquivias	J. Boon	
11:00	Coffee break			
	Power to X	**CO_2 to carbonates** Role of catalysts in carbonation/ mineralization	**CO_2 to chemicals** CO_2 to Oxygenates	**Policy Session**
Chair:	*G. Schmid*	*K. Lamb*	*A. Kleji*	*A. Bazzanella*
11:30	B. Stefansson	N. Zhang	K. Liu	S. Roth
11:50		B. Olaniyan	S. Bontemps	L. Popin
12:10	A. de Lhoneux	C. Mota	M. Siebert	J. Kemper
12:30	P. Styring		T. Kaiser	B. Olfe-Kräutlein
12:50	T. E. Müller	A. Brège	W. Huang	A. Chavez
13:10	Lunch break			
	Power to X Methanation	**CO_2 to carbonates** Natural materials mineralization	**Photocatalysis**	**Acceptance-Workshop** Public perceptions, acceptance, and communication design for CCU Products
Chair:	*A. Ausfelder*	*S. -E. Park*	*A. Bocarsly*	*K. Arning*
14:10	S. Santhanam	G. Brent	J. Tan	K. Arning
14:30	S. Garcia	J. Wang	K. Teramura	A. Linzenich
14:50	Z. Veselovskaya	A. M. Bremen	H. S. Jung	
15:10	R. Chauvy	A. Elhoweris	Y. Amao	
15:30	Coffee break			
	Power to X Syngas & Chemicals	**CO_2 to carbonates**	**Electrocatalysis**	**Roadmap and Guidelines**
Chair:	*P. Styring*	*J. Theulen*	*K. Teramura*	*S. Roth*
15:50	L. Dittrich	A. Kaleva	K. Torbensen	S. Bringezu
16:10	S. Pitter,	K. Lamb	M. König	
16:30	J. Kärki	A. Park	E. Yu	A. Sternberg
16:50	S. Gupta		A. Bocarsly	N. Thonemann
17:10	End of Conference Day			

PROGRAMME AT A GLANCE

Wednessday, 26 June 2019

	Brüssel			
08:30	PLENARY LECTURE H. Bach, Covestro AG, Leverkusen/D			
	Brüssel	K2	K3	K4
	CO_2 to chemicals CO_2 to Hydrocarbons		**Electrocatalysis**	**LCA /TEA**
Chair:	*E. Dinjus*		*E. Gyenge*	*K. Amrstrong*
09:20	C. Song		U.-P. Apfel	T. Wich
09:40	N. Heikkinen		S. Stojkovikj	J. Kleinekorte
10:00	C. Henriques		K. junge Puring	Q. Shen
10:20	Coffee break			
	CO_2 to Polymers	**CO_2 to chemicals** CO_2 for organic synthesis	**Catalysis**	**LCA /TEA**
Chair:	*C. Gürtler*	*A. Park*	*R. Heyn*	*A. Bardow*
11:00	M. Machat	A. Kleij	L. Gonsalvi	A. Zimmermann
11:20	J. Norwig		Y. Himeda	B. Kolosz
11:40	K. Melin	M. North	G. Zhang	S. Turnau
12:00	B. Grignard	D.-G. Yu	S. Rogg	K. Armstrong
12:20	Y. Gu	C. Johnson	S. -E. Park	C. Zhang
12:40	X. Feng	B. Buckley	H. Kawanami	S. McCord
13:00	Lunch break			
	CO_2 to chemicals CO_2 for organic synthesis	**CO_2 reforming**	**Biotechnological CO_2-conversion**	**LCA**
Chair:	*S. Müller*	*P. Sanderson*	*H. de Wever*	*B. Olfe-Kräutlein*
14:00	N. Sun	M. R. Damacherla	L. Maia	A. Bardow
14:20	M. Tamura	M. Lee	I. K. Stoll	
14:40		H. Pfeiffer	T. Jung	S. Troy
15:00	C. Maquilón		E. Yu	A. Lozanovski
15:20	Coffee break			
	Start-up Workshop and discussion	**Plasma technologies for CO_2 conversion**	**CO_2 to chemicals** CO_2 to methanol	
Chair:	*V. Sick*	*R. Rothman*	*T. E. Müller*	
15:50	V. Sick	A. Call	J. Wang	
16:10	G.W. Quance	F. Ahmad	B. Xie	
16:30	M. Kember	Y. Mu	N. Podrojková	
16:50	**Discussion** Participants: M. Kember, G.W. Quance, C. Gürtler	P. Kaliyappan	X. Tu	
17:10		D. Ray	C. -J. Liu	
17:30	End of Conference Day			
19:30	Europa	**CONFERENCE DINNER** (19:30 – 23:00)		

PROGRAMME AT A GLANCE

Thursday, 27 June 2019

	Brüssel	K2	K3	K4
	Power to X Process-Engineering & Techno-Economic Assesments	**Biotechnological CO_2-conversion**	**Capture and separation**	**LCA/TEA**
Chair:	*A. Varone*	*E. Yu*	*C. Song*	*A. Zimmermann*
09:30	H. Schramm	J. Mampel	S. Chen	H. Ostovari
09:50	F. Ortloff	H. de Wever	W. Pragot	S. Kaiser
10:10	J. Burre	P. Skoczinski	C. Pinheiro	K. Amrstrong
10:30	Coffee break			
	Power to X	**Biotechnological CO_2 conversion and LCA**	**Capture and separation**	**CO_2 to chemicals** CO_2 to methanol
Chair:	*F. Ortloff*	*J. Mampel*	*O. Hurtig*	*J. Boon*
11:00		L.Rachbauer	R. Edwards	T.Schuhmann
11:20	G. Herz	H. de Wever	B. Alcántar Vázquez	J. Stewart
11:40	A. Varone	M. Bachmann	A. Lockley	M. Gothe
12:00	**CLOSING REMARKS** (12:00 – 12:30)			

PROGRAMME

Sunday, 23 June 2019

16:00	Registration
	Room: Brüssel
17:30	**WELCOME** W. Leitner, RWTH Aachen/D; C. Gürtler, Covestro AG, Leverkusen/D
17:40	**WELCOME LECTURE** A. Quadrelli, CPE Lyon/FR
18:10	**GET TOGETHER** (welcome reception) (18:10 – 19:30)

Room: Brüssel

Chair: W. Leitner, RWTH Aachen/D

09:30	**OPENING CEREMONY**	09:30
09:45	**WELCOME** M. Wessling[1]; [1] RWTH Aachen/D	09:45
10:00	**Catalytic Conversion of CO_2 – Ups and Downs in Science and Innovation** E. Dinjus[1]; [1] Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen/D	10:00
10:15	**PLENARY LECTURE** **CO_2 as feedstock for synthetic fuels – status and perspectives** R. Schlögl[1]; [1] Max Planck Institut für chemische Energiekonversion, Mülheim a.d. Ruhr/D	10:15
11:00	Coffee break	11:00

	Room: Brüssel	Room: K 2	
	KOPERNIKUS P2X DAY P2X as a key technology for integrated energy	**CO_2-CAPTURE AND SEPARATION** Materials for Capture Processes	
	Chair: G. Schmid, Siemens AG/D	*Chair: H. Yamada, Research Institute of Innovative Technology for the Earth (RITE), Kizugawa, Kyoto/J*	
11:30	**Power-to-X: Storage, Utilization and Valorization of CO_2** R.-A. Eichel, Forschungszentrum Jülich GmbH/D	**Recent advances in intermediate- and high-temperature CO_2 capture materials** Q. Wang[1]; [1] Beijing Forestry University, Beijing/CN	11:30
11:50	**Renewable hydrocarbons from water, CO_2 and renewable energy** J. Baumgartner, K. Hauptmeier, sunfire GmbH/D	**Activation of Starbon® materials with KOH or CO_2 to enhance CO_2 capture** H. Li[1]; [1] University of York, York/UK	11:50
12:10	**Integration of Modular Technologies into P2X Value Chains** L. Schulz, INERATEC GmbH, Karlsruhe/D	**CO_2 Capture in Nonaqueous Solution Enhanced by Nanoparticles of TiO_2** S. Chen[1]; [1] , Qingdao University/CN	12:10
12:30	Lunch break		12:30
	KOPERNIKUS P2X DAY Power-to-Chemicals	**CO_2-CAPTURE AND SEPARATION** CO2-adsorption	
	Chair: R. Dittmeyer, Karlsruhe Institut für Technologie/D	*Chair: S. Chen, Dalian University of Technology, Dalian/CN*	
14:00	**Renewable Synthesis of chemical Feedstock and Specialties employing low temperature electrochemical reduction of CO_2** G. Schmid, Siemens AG, /D	**Modelling CO_2 Adsorption in Fixed-bed Columns using Long Short Term Memory (LSTM) Neural Network** C. Bajamundi[1]; [1] VTT Technical Research Centre of Finland, Jyväskylä/FIN	14:00
14:20		**Providing CO_2 by pressure-swing chemical absorption: Ionic liquid-based CO_2 separation technology** J. Schäffer[1]; F. Ortloff[1]; F. Graf[1]; T. Kolb[1]; [1] Engler-Bunte-Institut, KIT, Karlsruhe/D	14:20
14:40	**Title tbd.** A. Lüken, Covestro AG, Leverkusen/D	**Gas adsorption properties of electrospun carbon nanofibres for CO_2 valorization and storage** A. Kretzschmar[1]; H. Tempel[1]; H. Kungl[1]; R. Eichel[1]; [1] Forschungszentrum Jülich GmbH, Jülich/D	14:40
15:00	Coffee break		15:00
	KOPERNIKUS P2X DAY Power-to-Fuels	**CO_2-CAPTURE AND SEPARATION** Amine based CO_2 capture	
	Chair: R.-A. Eichel, Forschungsinstitut Jülich GmbH/D	*Chair: P. Behr, University Duisburg-Essen/D*	
15:30	**Kopernikus P2X: Potential of OME-based Synthetic Fuel blends to reduce Engine Emissions** S. Pischinger, B. Lehrheuer, A. Omari, RWTH Aachen/D	**Simulation of amine-based CO_2 capture using transition state theory** H. Yamada[1]; [1] Research Institute of Innovative Technology for the Earth (RITE), Kizugawa, Kyoto/J	15:30
15:50	**Power-to-Fuels – Overview and recent progress towards integrated processes based on modular units** R. Dittmeyer, Karlsruher Institut für Technologie/D	**Enhanced kinetics for CO_2 sorption in amine-functionalized mesoporous silica nanosphere with inverted cone-shaped pore structure** F. Lou[1]; A. Zhang[1]; G. Zhang[1]; L. Ren[1]; X. Guo[1]; C. Song[1]; [1] Dalian University of Technology, Dalian/CN	15:50
16:10	**Carbon Flows in the Swiss Energy Transition** Z. Stadler[1]; [1] Hochschule für Technik Rapperswil, Rapperswil/CH	**Amine solvent development for CO_2 capture and its application in China industry** S. Chen[1]; [1] Dalian University of Technology, Dalian/CN	16:10
	Room: K 3		
16:30	**POSTERPARTY** (16:30 – 18:00)		16:30

Room: Brüssel

Chair: W. Leitner, RWTH Aachen/D

09:30	**OPENING CEREMONY**	09:30
09:45	**WELCOME** M. Wessling[1]; [1] RWTH Aachen/D	09:45
10:00	**Catalytic Conversion of CO_2 – Ups and Downs in Science and Innovation** E. Dinjus[1]; [1] Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen/D	10:00
10:15	**PLENARY LECTURE** **CO_2 as feedstock for synthetic fuels – status and perspectives** R. Schlögl[1]; [1] Max Planck Institut für chemische Energiekonversion, Mülheim a.d. Ruhr/D	10:15
11:00	Coffee break	11:00

	Room: K 3	*Room: K 4*	
	CO_2 TO CARBONATE Industry-perspective on carbonation	**CO_2 TO CHEMICALS** CO_2 to Hydrocarbons	
	Chair: P. Knops, Green Minerals/NL	*Chair: T. Schaub, BASF SE, Ludwigshafen am Rhein/D*	
11:30	**How concrete and feed can use CO_2 to contribute to Paris-agreement: from R&D to commercialization** J. Theulen[1]; [1] HeidelbergCement AG, Eindhoven/NL	**Direct CO_2 hydrogenation into value-added hydrocarbons with high selectivity** P. Gao[1]; C. Yang[1]; Y. Sun[1]; [1] Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai/CN	11:30
11:50		**Single-atom cobalt and nitrogen coordinated carbon catalyst for CO_2 hydrogenation to liquid hydrocarbons** S. Hwang[1]; [1] Korea Research Institute of Chemical Technology (KRICT), Daejeon/ROK	11:50
12:10	**The development of carbonation in a box – commercial direct flue gas capture and utilisation.** P. Carey[1]; [1] Carbon8 Systems Limited, Chatham Maritime/UK	**Highly Active and Stable Catalysts Derived from ZIFs for Selective CO_2 Hydrogenation to Hydrocarbons** X. Guo[1]; J. Liu[1]; G. Zhang[1]; A. Zhang[1]; C. Song[2]; [1] Dalian University of Technology, Dalian/CN; [2] Pennsylvania State University, University Park/CN	12:10
12:30	Lunch break		12:30
	CO_2 TO CARBONATE Carbonation of concrete/ reclyed aggregates	**CO_2 TO CHEMICALS** CO_2 to Hydrocarbons	
	Chair: C. Mota, Federal University of Rio de Janeiro, Rio de Janeiro/BR	*Chair: C. Song, Pennsylvania State University, University Park, Pennsylvania/USA*	
14:00	**Carbon Dioxide Sequestration in Concrete Materials and Products** C. Shi[1]; [1] Hunan University, Changsha/CN	**Particle Size Effect of Unpromoted Iron-based catalyst in CO_2 Hydrogenation to Hydrocarbons Reaction** J. Zhu[1]; [1] Dalian University of Technology, Dalian/CN	14:00
14:20	**Simultaneous CO_2 and Steam Curing of Precast Concrete** I. Amr[1]; B. Fadhel[1]; S. Park[2]; A. Hunaidy[1]; R. Bamagain[1]; [1] Saudi Aramco, Dhahran/SAR; [2] Korea Advanced Institute of Science and Technology, Daejeon/ROK		14:20
14:40	**Carbon Dioxide Utilization for transformation of demolishing waste into cementitious materials** J. Skocek[1]; M. Zajac[1]; M. Ben Haha[1]; [1] HeidelbergCement AG, Leimen/D	**Direct synthesis of methane from bicarbonates and hydrogen to form carbonates as CO_2 absorbent** P. Behr[1]; [1] Universität Duisburg-Essen, Essen/D	14:40
15:00	Coffee break		15:00
	ELECTRO- AND PHOTOCATALYSIS	**CO_2 TO CHEMICALS** CO_2 to Hydrocarbons	
	Chair: A. Krüger, Universität Würzburg, Würzburg/D	*Chair:*	
15:30	**Multiphysics-Modeling-Based Design of Solar Fuel Devices for CO_2 Reduction** H. Zhang[1]; H. Wang[2]; J. Xuan[1]; [1] Loughborough University, Loughborough/UK; [2] Imperial College London, London/UK	**The development and validation of a microchannel reactor for carbon dioxide methanation** N. Engelbrecht[1]; D. Bessarabov[1]; [1] North-West University, Potchefstroom/ZA	15:30
15:50	**CO_2 reduction using Pt_2oFe8o/poly(triphenylamine) electrodes in a gas-diffusion electrolyzer** G. Gobaille-Shaw[1]; V. Del Angel Hernandez[1]; [1] University of Bristol/UK	**Catalytic carbonylation of olefins with carbon dioxide** X. Zhan[1]; C. Shen, L.Hen[1]; [1] Chinese Academy of Sciences, Lanzhou/CN	15:50
16:10	**Photocatalytic fixation of CO_2 with epoxides to form cyclic carbonates using Ru-TiO_2 Hyper-branched nanorods** S. Gavrielides[1]; j. tan[1]; E. Sanchez Fernandez[1]; M. Maroto-Valer[1]; [1] Heriot Watt University, Edinburgh/UK	**Carbon Flows in the Swiss Energy Transition** Z. Stadler[1]; [1] Hochschule für Technik Rapperswil, Rapperswil/CH	16:10
	Room: K 3		
16:30	**POSTERPARTY** (16:30 – 18:00)		16:30

Room: Brüssel

Chair: C. Gürtler, Covestro Deutschlang AG, LeverkusenD

08:30 **PLENARY LECTURE**
R&I Policy and support for CO_2 utilisation – what is on the Horizon
P. Dröll[1]; [1] European Commission, Research and Innovation, Brussels/B 08:30

	Room: Brüssel	Room: K 2	
	POLICY SESSION CO_2 FORUM	**CO_2 TO CARBONATES** Carbonation of industrial (by) products and wastes	
	Chair: Dr. Alexandra Quadrelli	*Chair: P. Carey, Carbon 8 Systems Limited/UK*	
09:20	**Introduction**	**CO_2 mineral sequestration by industrial wastes in Andalousie** L. Esquivias[1]; [1] University of Seville, Sevilla/E	09:20
09:30	**Title tba, Cefic**	**Technical and Economical Evaluations of A Co-production Process of $CaCO_3$ and $NaHCO_3$ Utiilizing CO_2 and Steel Slag** K. Han[1]; M. Lee[2]; S. Kim[2]; [1] Research Institute of Industrial Science & Technology, Gwangyang/ROK; [2] Keimyung Unviersity, Daegu/ROK	09:30
09:50	**Title tba** F. Ramos[1]; [1] DG Climate Action, European Commission, Brussels/B	**Mineralization from lab to business. From academic interest towards realization** P. Knops[1]; [1] Green Minerals, Twello/NL	09:50
10:10	**Low carbon chemical industry – fact or (science) fiction** A. Bazzanella[1]; F. Ausfelder[1]; [1] DECHEMA e.V., Frankfurt am Main/D	**Advantages of using ionic liquids high pressure biphasic systems in the homogeneous catalytic production of carbonates from CO_2** A. Nunes[1]; [1] LAQV-REQUIMTE/ FCT - NOVA University of Lisbon, Caparica/P	10:10
10:30	**Panel discussion:** Policy perspectives (10:30 – 11:00)	**CO_2 mineral sequestration by industrial wastes in Andalousie** L. Esquivias[1]; [1] Universidad de Sevilla, Seville/E	10:30
11:00	Coffee break		11:00
	POWER TO X	**CO_2 TO CARBONATES** Role of catalysts in carbonation/mineralization	
	Chair: G. Schmid, Siemens AG, Erlangen/D	*Chair: K. Lamb, Green Chemistry Centre of Excellence, University of York, York/UK*	
11:30	**Industrial scale Power-to-X: the success story of Vulcanol** B. Stefansson[1]; [1] Carbon Recycling International, Kopavogur/IS	**CO_2 sequestration by precipitating carbonates from aqueous alkaline solution with nickel nanoparticles in tubular reactor** N. Zhang[1]; R. Santos[2]; L. Šiller[1]; [1] Newcastle University, Newcastle upon Tyne/UK; [2] University of Guelph/CDN	11:30
11:50		**Direct synthesis of chloromethyl ethylene carbonate via CO_2 utilisation using a novel Zr/ZIF-8 catalyst** B. Olaniyan[1]; [1] London South Bank University, London/UK	11:50
12:10	**Power To X - from electrons to molecules** A. de Lhoneux[1]; D. Thomas[1]; [1] Hydrogenics GmbH, Oevel/B	**Production of Organic Carbonates over Heterogeneous Catalysts: Experimental and Theoretical Insights** C. Mota[1]; [1] Federal University of Rio de Janeiro, Rio de Janeiro/BR	12:10
12:30	**Planes, Trains and Automobiles: The Case for Synthetic e-Fuels in a Circular Economy** P. Styring[1]; [1] The University of Sheffield, Sheffield/UK		12:30
12:50	**Converting the Fluctuating Supply of Renewable Energy to Storable and Transportable Energy Carriers** T. Müller[1]; [1] Ruhr-Universität Bochum, Bochum/D	**Mechanistic and kinetic insights into the CO_2 addition over diols promoted by DBU/ alkylating agent dual systems** A. Brège[1]; [1] Bordeaux/F	12:50
13:10	Lunch break		13:10
	POWER TO X Methanation	**CO_2 TO CARBONATES** Natural materials mineralization	
	Chair: A. Ausfelder, DECHEMA e.V., Frankfurt am Main/D	*Chair: S. -E. Park, Inha University, Incheon/ROK*	
14:10	**Reduction of carbon dioxide and steam using high temperature electrolysis in power to methane systems** S. Santhanam[1]; M. Heddrich[1]; [1] DLR/Institute of engineering thermodynamics, Stuttgart/D	**Mineral Carbonation for CO_2 Utilisation: Developments in the MCi Project** G. Brent[1]; [1] Orica, Kurri Kurri/AUS	14:10
14:30	**CO_2 conversion via methanation reaction using Li_4SiO_4-NiO composites as dual functional materials** E. Vera[1]; M. Maroto-Valer[1]; S. Garcia[1]; [1] Heriot-Watt University, Edinburgh/UK	**$NaHCO_3$-promoted H_2 Production during Water-Olivine Reactions under High-temperature conditions** J. WANG[1]; N. Watanabe[2]; A. Okamoto[2]; K. Nakamura[2]; T. Komai[2]; [1] Tohoku University, Aoba-Ku, Sendai-Shi, Miyagi-Ken/J; [2] Tohoku University, Sendai/J	14:30
14:50	**Direct Air Capture/Methanation process for transforming atmospheric CO_2 to CH_4** I. Veselovskaya[1]; O. Netskina[2]; A. Okunev[1]; [1] Novosibirsk State University, Novosibirsk/RUS; [2] Boreskov Institute of Catalysis SB RAS, Novosibirsk/RUS	**Towards Model-based Design and Optimization of Mineral Carbonation Processes** A. Bremen[1]; T. Ploch[1]; A. Mhamdi[1]; A. Mitsos[1]; [1] RWTH Aachen University, AVT - Aachener Verfahrenstechnik, Process Systems Engineering, Aachen/D	14:50
15:10	**Production of Synthetic Natural Gas from Industrial Carbon dioxide** R. Chauvy[1]; L. Dubois[1]; D. Thomas[1]; G. De Weireld[1]; [1] UMONS, Mons/B	**A conceptual design for a carbon capture and utilisation process for the production of alternative building materials** A. Elhoweris[1]; [1] Gulf Organisation for Research and Development, Doha/Q	15:10
15:30	Coffee break		15:30
	POWER TO X Syngas & Chemicals	**CO_2 TO CARBONATES**	
	Chair: P. Styring, The University of Sheffield, Sheffield/UK	*Chair: J. Theulen, HeidelbergCement AG/D*	
15:50	**CO_2-valorization by co-electrolysis – A method to produce tailored syngas** L. Dittrich[1]; S. Foit[2]; I. Vinke[2]; L. de Haart[2]; R. Eichel[2]; [1] RWTH Aachen University, Aachen/D; [2] Forschungszentrum Jülich GmbH, Jülich/D	**Formation of carbonate structures on Zn surfaces by $scCO_2$** A. Kaleva[1]; V. Saarimaa[2]; J. Nikkanen[1]; T. Tassaing[3]; G. Le Bourdon[3]; A. Markkula[4]; P. Väisänen[4]; E. Levänen[1]; [1] Tampere University, Tampere, Finland/FIN; [2] Top Analytica Ab, Turku/FIN; [3] University of Bordeaux/F; [4] SSAB Europe Oy, Hämeenlinna/FIN	15:50
16:10	**CO_2-rich syngas, an option for energy-related chemical processes?** S. Pitter[1]; [1] KIT, Eggenstein-Leopoldshafen/D	**Influence of mesoporous silica properties on cyclic carbonate synthesis catalysed by supported aluminium(salen) complexes** P. Carvalho[1]; J. Comerford[2]; K. Lamb[2]; M. North[2]; [1] SINTEF Materials and Chemistry, Oslo/N; [2] Green Chemistry Centre of Excellence, University of York, York/UK	16:10
16:30	**Climate-friendly hydrocarbons from biogenic carbon dioxide and renewable electricity** J. Kärki[1]; E. Tsupari[1]; M. Hurskainen[1]; P. Simell[1]; J. Lehtonen[1]; [1] VTT Technical Research Centre of Finland Ltd, Jyvaskyla/FIN	**CO_2 Utilization via Carbon Mineralization for Enhanced Extraction of Alkaline Metals and Rare Earth Elements from Unconventional Resources** A. Park[1]; [1] Columbia University, New York/USA	16:30
16:50	**Reversible solid oxide cell based energy storage and methanol production system** S. Gupta[1]; S. Santhanam[1]; M. Heddrich[1]; K. Friedrich[1]; [1] German Aerospace Center (DLR), Stuttgart/D		16:50

Room: Brüssel

Chair: C. Gürtler, Covestro Deutschlang AG, LeverkusenD

08:30 **PLENARY LECTURE**
R&I Policy and support for CO_2 utilisation – what is on the Horizon
P. Dröll[1]; [1] European Commission, Research and Innovation, Brussels/B 08:30

	Room: K 3	Room: K 4	
	CO_2 TO CHEMICALS CO_2 to Oxygenates		
	Chair: M. North, University of York, Green Chemistry Center of Excellence, York/UK		
09:20	**Bimetallic Electrocatalysts for CO_2 Electroreduction to Formate** E. Gyenge[1]; C. Moore[1]; F. Mayer[1]; [1] University of British Columbia, Vancouver/CDN		09:20
09:30	**Carbon dioxide hydrogenation into dimethyl ether with CuO-ZnO-ZrO_2 catalyst and ZSM_5 zeolite** K. Parkhomenko[1]; B. Louis[1]; A. Roger[1]; [1] CNRS, University of Strasbourg/F		09:30
09:50	**Development of different hybrid catalytic strategies for the valorisation CO_2** P. Vidinha[1]; M. Gothe[1]; J. Rozendo[1]; A. L Figueredo[1]; M. Villegas[1]; M. Infante[1]; J. Peloso[1]; F. Perez[1]; C. Gambini[1]; C. Oller[1]; L. Rossi[1]; R. Bazito[1]; [1] University of Sao Paulo/BR		09:50
10:10	**Mechanistic studies of CO_2 reduction to hydrogenation using homogenous catalysis** J. Rozendo de Lima[1]; [1] University of Sao Paulo, São Paulo/BR		10:10
10:30	**Towards a circular carbon economy with separation-enhanced processes for the capture and utilisation of CO_2** J. Boon[1]; [1] TNO, Petten/NL		10:30
11:00	Coffee break		11:00
	CO_2 TO CHEMICALS CO_2 to Oxygenates	**POLICY SESSION**	
	Chair: A. Kleji, Istitute of Chemical Research of Catalonia, Tarragona/ES	*Chair: A. Bazzanella, DECHEMA e.V., Frankfurt am Main/D*	
11:30	**An Intensified Electro-Catalytic Process for Production of Formic Acid from Power Plant CO_2 Emissions** K. Liu[1]; [1] University of Kentucky, Lexington/USA	**PHOENIX – A European Integrated approach to CO_2 valorisation** S. Roth[1]; [1] Forschungszentrum Jülich GmbH, Berlin/D	11:30
11:50	**Reductive CO_2 homocoupling: de novo synthesis of a C_3 carbohydrate** S. Bontemps[1]; [1] LCC-CNRS, Toulouse/F	**Role of Carbon Capture and Utilization and Synthetic Fuels for Climate Mitigation from a Systems Perspective** L. Popin[1]; [1] Potsdam Institute for Climate Impact Research (PIK), Potsdam/D	11:50
12:10	**An Alternative Approach towards Formaldehyde: Univariate and Multivariate Analysis in the Ruthenium-Catalyzed Transformation of Carbon Dioxide to Dimethoxymethane** M. Siebert[1]; M. Seibicke[1]; O. Trapp[1]; [1] LMU Munich, München/D	**Greenhouse gas emissions accounting for CO_2 capture and utilisation (CCU) technologies** P. Zakkour[1]; G. Cook[1]; M. Akai[2]; K. Itaoka[2]; S. Chae[3]; J. Kemper[4]; [1] Carbon Counts, Palgrave/UK; [2] I2CNER, Kyushu University, Fukuoka/J; [3] QJ Science, Yokohama/J; [4] IEAGHG, Cheltenham/UK	12:10
12:30	**Methyl formate from CO_2: a model based parameter study with experimental validation** T. Kaiser[1]; M. Scott[2]; C. Westhues[2]; G. Franciò[2]; W. Leitner[2]; W. Leitner[3]; A. Jupke[1]; [1] RWTH Aachen University, AVT- Fluid Process Engineering, Aachen/D; [2] RWTH Aachen University, ITMC, Aachen/D; [3] MPI for Chemical Energy Conversion, Mülheim an der Ruhr/D	**Identification and analysis of promising carbon capture and utilisation technologies, including their regulatory aspects** B. Olfe-Kräutlein[1]; [1] Institute for Advanced Sustainability Studies, Potsdam/D	12:30
12:50	**Photo-thermal coupling factor achieving CO_2 reduction based on palladium-nanoparticle-loaded TiO_2** W. Huang[1]; C. Xu[1]; Z. Li[1]; B. Deng[1]; Y. Zhang[1]; [1] Zhejiang University, Hangzhou/CN	**Incentivizing Carbon Utilization Research** A. Chavez[1]; [1] Northern Kentucky University, Highland Heights, KY/USA	12:50
13:10	Lunch break		13:10
	PHOTOCALYSIS	**ACCEPTANCE-WORKSHOP**	
	Chair: A. Bocarsly, Princeton University, Princeton, NJ/USA	*Chair: K. Arning, RWTH Aachen University, Aachen/D*	
14:10	**In_2O_3/Yellow TiO_2 Microspheres for CO_2 photocatalytic Reduction** j. tan[1]; M. Maroto-Valer[1]; p. renones brasa[2]; V. A. de la Peña[2]; f. fresno garcia[2]; [1] Heriot-Watt University, Edinburgh/UK; [2] Institute IMDEA Energy, Madrid/E	**What is it good for? Drivers of CCU product acceptance and purchase intentions.** K. Arning[1]; A. Linzenich[1]; M. Ziefle[1]; [1] RWTH Aachen University, Aachen/D	14:10
14:30	**Highly Concentrated CO Evolution for Photocatalytic Conversion of CO_2 by H_2O as an Electron Donor** K. Teramura[1]; [1] Kyoto University, Kyoto/J	**Putting CCU risks into perspective: A comparison of risk perception across nine energy technologies** A. Linzenich[1]; K. Arning[1]; M. Ziefle[1]; [1] Human-Computer Interaction Center, RWTH Aachen University, Aachen/D	14:30
14:50	**Photocatalytic CO_2 Conversion by ordered mesoporous ternary compound semiconductor materials** H. Jung[1]; J. Joo[1]; K. Lee[1]; Y. Kang[1]; [1] Korea University, Seoul/ROK	**Towards an informative, comprehensible CCU product label: An empirical study on requirements for CCU labeling** A. Linzenich[1]; K. Arning[1]; M. Ziefle[1]; [1] Human-Computer Interaction Center, RWTH Aachen University, Aachen/D	14:50
15:10	**Light-driven CO_2 reduction to formate with the system of biocatalyst and semiconductor based photocatalyst** Y. Amao[1]; T. Ishibashi[1]; S. Ikeda[2]; [1] Osaka City University, Osaka/J; [2] Konan University, Kobe/J		15:10
15:30	Coffee break		15:30
	ELECTROCATALYSIS	**ROADMAP AND GUIDELINES**	
	Chair: K. Teramura, Kyoto University, Kyoto/J	*Chair: S. Roth, PTJ/D*	
15:50	**Electrocatalytic Reduction of Carbon Dioxide with Earth Abundant Materials: On the Route to Industrial-Scale Applications** K. Torbensen[1]; B. Boudy[1]; W. Braun[2]; C. Haegele[2]; M. Robert[1]; [1] Universite Paris Diderot, Paris/F; [2] Air Liquide, Frankfurt/D	**Promising options and perspectives for supplying chemical and polymer industries with recycled carbon** S. Bringezu[1]; [1] University of Kassel, Kassel/D	15:50
16:10	**Non-aqueous Electrochemical CO_2 Reduction to Oxalic Acid using gas diffusion electrodes** M. König[1]; E. Klemm[2]; D. Pant[1]; [1] Flemish Institute for Technological Research (VITO), MOL/B; [2] University of Stuttgart/D		16:10
16:30	**Enhanced selectivity of carbonaceous products from electrochemical reduction of CO_2 in aqueous media** E. Yu[1]; H. Xiang[1]; [1] Newcastle University, Newcastle upon Tyne/UK	**Temporary storage of CO_2 for CO_2-based products** A. Sternberg[1]; C. Hank[1]; A. Schaadt[1]; C. Hebling[1]; [1] Fraunhofer-Institut für Solare Energiesysteme ISE, Freiburg/D	16:30
16:50	**Metal Alloy Electrocatalysis for the Synthesis of Higher Order Organics from CO_2** A. Bocarsly[1]; A. Paris[1]; [1] Princeton University, Princeton, NJ/USA	**Consequential life cycle assessment of carbon capture and use alternatives within the chemical industry** N. Thonemann[1]; M. Pizzol[2]; [1] Fraunhofer-Institute for Environmental, Safety, and Energy Technology UMSICHT, Oberhausen/D; [2] Aalborg University, Aalborg/DK	16:50

Room: Brüssel

Chair: W. Leitner, RWTH Aachen/D

08:30 **PLENARY LECTURE**
Sustainable polymers based on CO_2
H. Bach[1]; [1] Covestro Deutschland AG, Leverkusen/D 08:30

Room: Brüssel

CO_2 TO CHEMICALS
CO_2 to Hydrocarbons

Chair: E. Dinjus

09:20 **Fe-Cu Bimetallic Catalysts for CO_2 Hydrogenation to C_2+ Hydrocarbons**
C. Song[1]; N. Boreriboon[1]; W. Wang[1]; X. Jiang[1]; X. Nie[2]; G. Zhang[2]; X. Guo[2]; P. Prasassarakich[3]; [1] Pennsylvania State University, University Park, Pennsylvania/USA; [2] Dalian University of Technology, Dalian/CN; [3] Chulalongkorn University, Bangkok/T 09:20

09:40 **Utilization of captured industrial carbon dioxide for chemicals**
N. Heikkinen[1]; N. Kaisalo[1]; P. Eskelinen[1]; M. Reinikainen[1]; [1] VTT Technical Research Centre of Finland Ltd, Espoo/FIN 09:40

10:00 **Roadmap for improving zeolite-based catalysts properties for their application in CO_2 methanation**
C. Henriques[1]; J. Lopes[1]; C. Henriques[1]; M. Bacariza[2]; [1] Instituto Superior Técnico, Lisboa/P; [2] Centro de Química Estrutural, Instituto Superior Técnico, Lisbon/P 10:00

10:20 Coffee break 10:20

	CO_2 TO POLYMERS	CO_2 TO CHEMICALS CO_2 for organic synthesis	
	Chair: C. Gürtler, Covestro, Leverkusen/D	*Chair: A. Park, Columbia University, New York/USA*	
11:00	**Carbon4Pur** M. Machat[1]; [1] Covestro Deutschland AG, Leverkusen/D	**New Catalytic Approaches for CO_2 Valorization into Heterocycles** A. Kleij[1]; [1] The Institute of Chemical Research of Catalonia (ICIQ), Tarrgona/E	11:00
11:20	**Title tba** J. Norwig[1]; [1] Covestro Deutschland AG, Leverkusen/D		11:20
11:40	**Fossil free polycarbonate polyols from captured carbon dioxide** J. Lehtonen[1]; K. Melin[2]; [1] VTT Technical Research Centre of Finland Ltd, Espoo/FIN; [2] VTT Technical Research Centre of Finland, Espoo/FIN	**Reaction of CO_2 with aziridines** M. North[1]; [1] University of York, Green Chemistry Center of Excellence, York/UK	11:40
12:00	**Upgrading CO_2 into novel families of regioregular and functional polymers** B. Grignard[1]; [1] University of Liege, Liege/B	**CO_2 Utilization in Organic Synthesis** D. Yu[1]; [1] Sichuan University, Chengdu/CN	12:00
12:20	**Copolymerization of CO_2 and α,ω-diols using CeO_2 and $_2$-furonitrile** Y. Gu[1]; [1] Graduate School of Engineering, Tohoku University, Sendai/J	**Ag(I) catalysed carboxylative cyclisation of propargylic alcohols to exo-vinylene carbonates** C. Johnson[1]; S. Dabral[1]; B. Bayarmagnai[1]; M. Hermsen[2]; Y. Schießl[3]; V. Mormul[2]; A. Hashmi[3]; T. Schaub[2]; [1] Catalysis Research Laboratory (CaRLa), Heidelberg/D; [2] BASF SE, Ludwigshafen/D; [3] Institute of Organic Chemistry, Heidelberg University, Heidelberg/D	12:20
12:40	**Metal-Free Copolymerization of CO_2 and Epoxides: From Super High Molar Mass Polycarbonates to Low Molar Mass Polyols** X. Feng[1]; [1] King Abdullah University of Science and Technology (KAUST), Thuwal/SAR	**Selective Anti-Markovnikov Hydrocarboxylation of Olefins: Formation of all-carbon quaternary centres** B. Buckley[1]; [1] Loughborough University, Loughborough/UK	12:40

13:00 Lunch break 13:00

	CO_2 TO CHEMICALS CO_2 for organic synthesis	CO_2 REFORMING	
	Chair: S. Müller, DECHEMA e.V., Frankfurt am Main/D	*Chair: P. Sanderson, University of Sheffield, Sheffield/UK*	
14:00	**Carboxylation of terminal alkynes with CO_2 over Ag loaded ZIF-8** N. Sun[1]; J. Shi[1]; L. Zhang[1]; Q. Shen[1]; Q. Gao[1]; W. Wei[1]; [1] Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai/CN	**Bi-reforming of methane with steam and carbon dioxide : effect of operating conditions** M. Damacherla[1]; S. G[2]; R. M Badhe[2]; A. Sharma[2]; K. Dr G S[2]; [1] Indian Oil Corporation Ltd., R&D Centre,, Faridabad/IND; [2] IOCL R&D Centre, Faridabad/IND	14:00
14:20	**Direct methyl N-phenylcarbamate synthesis from CO_2, aniline and methanol using a combination catalyst of CeO_2 and $_2$-cyanopyridine** M. Tamura[1]; [1] Tohoku University, Aramaki, Aoba-ku, Sendai, Miyagi/J	**Ce-enhanced Fe_2O_3/Al_2O_3 for CO_2 utilization in chemical looping partial oxidation of methane** D. Kang[1]; M. Lee[1]; H. Lim[1]; J. Lee[1]; [1] Korea Advanced Institute of Science and Technology (KAIST), Daejeon/ROK	14:20
14:40		**Advances on CO_2 sorption and subsequent catalytic conversion to added value products, using alkaline ceramics** H. Pfeiffer[1]; [1] Universidad Nacional Autónoma de México, Mexico City/MEX	14:40
15:00	**Stereo/Regio-Divergent Synthesis with CO_2** C. Maquilón[1]; [1] ICIQ, Tarragona/E		15:00

15:20 Coffee break 15:20

	START-UP WORKSHOP, DISCUSSION	PLASMA TECHNOLOGIES FOR CO_2 CONVERSION	
	Chair: V. Sick, University of Michigan, Michigan/USA	*Chair: R. Rothman, University of Sheffield, Sheffield/UK*	
15:50	V. Sick, University of Michigan, Ann Arbor/USA Q.W. Quance, Solid Carbon Products, Salt Lake City/USA M. Kember, Econic Technologies Ltd., Macclesfield/UK	**Plasma and Fluidic Oscillation Assisted Electrolysis of CO_2 Using a Solid Oxide Cell** A. Call[1]; T. Holmes[2]; P. Desai[2]; W. Zimmerman[1]; R. Rothman[1]; [1] The University of Sheffield, Sheffield/UK; [2] Perlemax, Sheffield/UK	15:50
		Low-Temperature CO_2 Methanation: Understanding the role of Ni in plasma – catalyst synergism F. Ahmad[1]; E. Lovell[1]; J. Scott[1]; R. Amal[1]; [1] Particle and Catalysis Research Group, University of New South Wales, Sydney/AUS	16:10
		Integrated Membrane Separation and Non-thermal Plasma (NTP) Assisted Catalysis Process for Upgrading Biogas Y. Mu[1]; H. Chen[1]; X. Fan[1]; C. Hardacre[1]; [1] University of Manchester, The Mill, Manchester/UK	16:30
16:50	**DISCUSSION** Participants: M. Kember, Q. W. Quance, C. Gürtler	**Core-Shell SiO_2@TiO_2 beads for Plasma Catalytic CO_2 Dissociation in a Packed bed DBD reactor** P. Kaliyappan[1]; K. Leyssens[2]; P. Samyn[1]; V. Meynen[2]; A. Hardy[1]; M. K. Van Bael[1]; [1] Universiteit Hasselt/B; [2] University of Antwerp/B	16:50
16:50	End of conference day	**CO_2 activation by Cu/γ-Al_2O_3 promoted DBD plasma** D. Ray[1]; S. Ch.[1]; [1] Indian Institute of Technology Hyderabad, Sangareddy/IND	16:50

19:30 **CONFERENCE DINNER** (19:30 – 23:00) 19:30

Room: Brüssel

Chair: W. Leitner, RWTH Aachen/D

08:30 **PLENARY LECTURE**
Sustainable polymers based on CO_2
H. Bach[1]; [1] Covestro Deutschland AG, Leverkusen/D 08:30

	Room: K 3 ELECTROCATALYSIS	Room: K 4 LCA/TEA	
	Chair: E. Gyenge, Agora Energy Technologies Ltd., Vancouver/CDN	*Chair: K. Amrstrong, The University of Sheffield, Sheffield/UK*	
09:20	**$Fe_{0.5}Ni_{4.5}S_8$ Electrocatalysts: A Promising Material for the Hydrogen Evolution and CO_2 Reduction Reactions** S. Piontek[1]; M. Smialkowski[1]; K. junge Puring[2]; D. Tetzlaff[2]; D. Siegmund[2]; U. Apfel[1]; [1] Ruhr-University Bochum/D; [2] Fraunhofer UMSICHT, Oberhausen/D	**Carbon$_2$Chem® Co-simulation framework as a tool for CCU technology assessments** T. Wich[1]; H. Wagner[2]; M. Oles[3]; A. Diekmann[2]; J. Grundler[2]; G. Deerberg[4]; [1] thyssenkrupp AG/ Ruhr-Universität Bochum, Essen/D; [2] thyssenkrupp AG TCCT, München/D; [3] thyssenkrupp AG, Essen/D; [4] Fraunhofer UMSICHT/Ruhr-Universität Bochum, Oberhausen/D	09:20
09:40	**Study of copper/copper sulfide composites as catalysts for electrochemical reduction of carbon dioxide** S. Stojkovikj[1]; M. Najdoski[2]; V. Koleva[3]; M. Mayer[1]; [1] Helmholtz Zentrum Berlin für Materialen und Energie, Berlin/D; [2] Institute of Chemistry, Faculty of Natural Sciences and Mathematics, Ss. Cyril and Methodius University, Skopje/MK; [3] Institute of General and Inorganic Chemistry, Bulgarian Academy of Sciences, Sofia/BG	**Environmentally optimal conversion pathways for gaseous carbon waste streams from steel mills** J. Kleinekorte[1]; A. Kalousdian[1]; A. Bardow[2]; [1] Institute of Technical Thermodynamics, RWTH Aachen University, Aachen/D; [2] Institute of Technical Thermodynamics, RWTH Aachen University & Institute of Energy and Climate Research - Energy Systems Engineering (IEK-10), Forschungszentrum Jülich GmbH, Aachen/ Jülich/D	09:40
10:00	**Preparation and Evaluation of Copper Gas Diffusion Electrodes for Electrochemical CO_2 Reduction** K. junge Puring[1]; P. Derks[2]; U. Apfel[1]; [1] Fraunhofer UMSICHT/Ruhr University Bochum, Oberhausen/Bochum/D; [2] Fraunhofer UMSICHT, Oberhausen/D	**Environmental impacts analysis of typical methanol production routes by life cycle analysis** Q. Shen[1]; [1] , Shanghai/CN	10:00

10:20 Coffee break 10:20

	CATALYSIS	LCA/TEA	
	Chair: R. Heyn, Sintef Industry, Oslo/N	*Chair: A. Bardow, RWTH Aachen/D*	
11:00	**Manganese(I) Hydridocarbonyl Catalysts for Homogeneous CO_2 Reduction to Formate and Methanol Under Mild Conditions** L. Gonsalvi[1]; F. Bertini[1]; M. Peruzzini[1]; M. Glatz[2]; N. Gorgas[2]; B. Stoeger[2]; K. Kirchner[2]; L. Veiros[3]; [1] Consiglio Nazionale delle Ricerche - Istituto di Chimica dei Composti Organometallici (ICCOM-CNR), Sesto Fiorentino/I; [2] TU Wien/A; [3] IST-University of Lisbon/P	**The cost of OME_{3-5} e-fuels from CO_2 and electricity, a comparative TEA** A. Zimmermann[1]; E. Gençer[2]; F. O'Sullivan[2]; R. Schomäcker[1]; [1] TU Berlin, Berlin/D; [2] MIT, Cambridge/USA	11:00
11:20	**Hydrogenation of CO_2 Catalyzed by Iridium Complexes with Proton-Responsive Ligands** Y. Himeda[1]; [1] National Institute of Advanced Industrial Science and Technology, Tsukuba/J	**Techno-economic analysis of renewable jet fuel through co-valorisation of CO_2 and wood pellets** B. Kolosz[1]; B. Xu[1]; S. Ahmad[1]; M. Maroto-Valer[1]; J. Andresen[1]; [1] Heriot-Watt University, Edinburgh/UK	11:20
11:40	**RWGS over In_2O_3 with different crystal phases and the phase transition under reaction conditions** J. Wang[1]; G. Zhang[1]; C. Song[2]; X. Guo[1]; [1] Dalian University of Technology, Dalian/CN; [2] Pennsylvania State University, University Park/USA	**Comparative cross-sectoral life-cycle cost and value chain analysis of production, use and recycling of CO_2 based products** S. Turnau[1]; S. Bringezu[1]; [1] University of Kassel/D	11:40
12:00	**The structural dynamics of supported vanadia catalysts: a comparative study of CO_2 and O_2 during propane ODH by using operando UV Raman spectroscopy** S. Rogg[1]; M. Mathes[1]; C. Hess[1]; [1] Eduard-Zintl-Institut, TU Darmstadt, Darmstadt/D	**Integrating LCA and TEA for analysis of CCU processes** K. Armstrong[1]; J. Wunderlich[2]; P. Styring[1]; [1] The University of Sheffield/UK; [2] TU Berlin/D	12:00
12:20	**Low Alkane Oxydehydrogenation with CO_2 as Soft Oxidant** S. Park[1]; [1] Inha University, Incheon/ROK	**Direct conversion of carbon dioxide to liquid fuels and synthetic natural gas using renewable power: Techno-economic analysis** C. Zhang[1]; K. Jun[1]; S. Kim[1]; S. Hwang[1]; H. Park[1]; [1] Korea Research Institute of Chemical Technology, Daejeon/ROK	12:20
12:40	**Interconversion between CO_2 and HCOOH catalyzed by PdAu nanoparticles supported by graphene oxide under high-pressure conditions** H. Kawanami[1]; [1] National Institute of Advanced Industrial Science and Technology, Sendai, Miyagi/J	**Practical use of the Global CO_2 Initiative TEA and LCA Guidelines for CO_2 Utilization: Mineralization of CO_2 Worked Example** S. McCord[1]; A. Villa Zaragoza[1]; P. Sanderson[1]; K. Armstrong[1]; P. Styring[1]; [1] University of Sheffield/UK	12:40

13:00 Lunch break 13:00

	BIOTECHNOLOGICAL CO_2-CONVERSION	LCA	
	Chair: H. de Wever, Flemish Institute for Technological Research (VITO), Mol/B	*Chair: B. Olfe-Kräutlein, Institute for Advanced Sustainability Studies, Potsdam/D*	
14:00	**Enzimatic CO_2 reduction to formate: towards a biocatalyst for the use of the abundant atmospheric CO_2** L. Maia[1]; J. Moura[1]; [1] LAQV, REQUIMTE, FCT NOVA, Portugal, Caparica/P	**A world made from CO_2? A life-cycle perspective on the potential of carbon capture and utilization** A. Bardow[1]; [1] RWTH Aachen University, Aachen/D	14:00
14:20	**Continuous Syngas Fermentation at Elevated Pressure** I. Stoll[1]; N. Boukis[1]; J. Sauer[1]; [1] Karlsruhe Institute of Technology (KIT), Institute of Catalysis Research and Technology (IKFT), Eggenstein-Leopoldshafen/D		14:20
14:40	**Using a thermoacidophilic cathodic biofilm to drive waste gas driven polyhydroxyalkanoate production** T. Jung[1]; J. Reiner[1]; M. Hackbarth[2]; M. Fink[3]; C. Lapp[1]; H. Horn[2]; S. Kerzenmacher[3]; J. Gescher[1]; [1] Department of Applied Biology, Karlsruhe Institute of Technology (KIT), Karlsruhe/D; [2] Engler-Bunte-Institut, Karlsruhe Institute of Technology (KIT), Karlsruhe/D; [3] Center for Environmental Research and Sustainable Technology (UFT), University of Bremen/D	**LCA of CCU-Chain Demonstration in the ALIGN-CCUS project – Poly(oxymethylene) Dimethyl Ethers from H_2 and CO_2** S. Troy[1]; P. Zapp[1]; P. Moser[2]; G. Wiechers[2]; M. Majid[3]; A. Heberle[3]; H. Kakihira[4]; M. Maruyama[4]; R. Peters[1]; S. Weiske[1]; B. Lehrheuer[5]; M. Neumann[5]; T. Schnorbus[6]; E. Gotheer[7]; [1] Forschungszentrum Jülich/D; [2] RWE Power AG, Essen/D; [3] Mitsubishi Hitachi Power Systems Europe GmbH, Duisburg/D; [4] Asahi Kasei Europe GmbH, Düsseldorf/D; [5] VKA, RWTH Aachen University, Aachen/D; [6] FEV Europe GmbH, Aachen/D; [7] TNO, Delft/NL	14:40
15:00	**Converting CO_2 to Fuels and Chemicals with Microbial electrosynthesis (MES)** E. Yu[1]; P. Izadi[1]; [1] Newcastle University, Newcastle upon Tyne/UK	**Life Cycle Assessment of a commercial scale CO_2 – Direct Air Capture Plant** A. Lozanovski[1]; M. Held[2]; T. Betten[1]; [1] University of Stuttgart/D; [2] Fraunhofer Institue for Building Physics, Stuttgart/D	15:00

15:20 Coffee break 15:20

CO_2 TO CHEMICALS
CO_2 to methanol

Chair: T. E. Müller, Ruhr-Universität Bochum, Bochum/D

15:50 **Mesoporous Indium Oxide as a Superior Catalyst for Methanol Synthesis by CO_2 Hydrogenation**
J. Wang[1]; [1] Dalian University of Technology, Dalian/CN 15:50

16:10 **Electron-Mediated Photonic Synergism in Industrial Cu/ZnO/Al_2O_3 Catalyst for Enhanced Methanol Production**
B. Xie[1]; R. Wong[1]; T. Tan[2]; J. Scott[1]; K. Aguey-Zinsou[1]; R. Amal[1]; [1] University of New South Wales, Sydney/AUS; [2] Kyushu University, Sydney/AUS 16:10

16:30 **ZnO/Cu core-shell nanoparticles for CO_2 hydrogenation**
N. Podrojková[1]; A. Oriňak[1]; R. Oriňaková[1]; [1] Pavol Jozef Šafárik University in Košice/SK 16:30

16:50 **Cold plasma-catalytic process for methanol synthesis from CO_2 hydrogenation at room temperature and ambient pressure**
L. Wang[1]; Y. Wang[1]; X. Tu[1]; [1] University of Liverpool/UK 16:50

16:50 **Recent Adances in CO_2 Hydrogenation to Methanol on In_2O_3 Supported Catalysts**
C. Liu[1]; [1] Tianjin University, Tianjin/CN 16:50

19:30 **CONFERENCE DINNER** (19:30 – 23:00) 19:30

	Room: Brüssel	Room: K 2	
	POWER TO X	**BIOTECHNOLOGICAL CO_2 CONVERSION**	
	Chair: A. Varone, Center for Advanced Studies Research and Development, Sardinia, Pula/It	*Chair: E. Yu, Newcastle University, Newcastle upon Tyne/UK*	
09:30	**Coupling of power, fuels, chemicals: techno-economical aspects of green chemicals production** H. Schramm[1]; R. Schneider[1]; I. Pyc[2]; G. Zimmermann[2]; [1] Siemens AG, Frankfurt am Main/D; [2] Siemens AG, Erlangen/D	**Bite-sizing the challenge: a modular approach for the biotechnological valorization of CO_2** J. Mampel[1]; G. Meurer[1]; [1] BRAIN AG, Zwingenberg/D	09:30
09:50	**CO_2 for PtX processes in Germany: Volumes & utilization costs** F. Ortloff[1]; J. Schäffer[1]; F. Graf[1]; T. Kolb[1]; C. Imberg[2]; J. Senner[2]; U. Lubenau[3]; [1] Engler-Bunte-Institut, KIT, Karlsruhe/D; [2] Gas- und Wärmeinstitut (GWI), Essen/D; [3] Deutsches Brennstoffinstitut (DBI), Leipzig/D	**Carbon Capture and Utilization (CCU) in Flanders with special focus on the role of biotechnology for CO_2 conversion** H. De Wever[1]; [1] VITO - Flemish Institute for Technological Research, Mol/B	09:50
10:10	**Towards a Clean and Economic Production of OME_1 from CO_2 and H_2: Process Development and Analysis** J. Burre[1]; D. Bongartz[1]; A. Ziegler[2]; S. Deutz[3]; A. Bardow[3]; A. Mitsos[1]; [1] Aachener Verfahrenstechnik - Process Systems Engineering, RWTH Aachen University, Aachen/D; [2] RWTH Aachen University, Aachen/D; [3] Institute of Technical Thermodynamics, RWTH Aachen University, Aachen/D	**Biotechnological conversion of CO_2 and off-gases to various products – What is possible from lab over demonstration to commercial scale?** P. Skoczinski[1]; A. Raschka[1]; [1] nova-Institut GmbH, Hürth/D	10:10
10:30	Coffee break		10:30
	POWER TO X	**BIOTECHNOLOGICAL CO_2 CONVERSION AND LCA**	
	Chair: F. Ortloff, Engler-Bunte-Institut, KIT, Karlsruhe/D	*Chair: J. Mampel, BRAIN AG, Zwingenberg/D*	
11:00		**Microbial CO_2 Utilization within the Carboxylate Platform** L. Rachbauer[1]; M. Lesniak[1]; B. Drosg[1]; W. Fuchs[2]; G. Bochmann[2]; [1] Bioenergy2020+, Tulln/A; [2] University of Natural Resources and Life Sciences, Vienna, Tulln/A	11:00
11:20	**Design, implementation and upscaling of a Power-to-X process** G. Herz[1]; [1] Fraunhofer IKTS, Dresden/D	**Technological advances in CO_2 Electrobiorefinery: Linking Bioelectrochemical CO_2 reduction with Renewable Energy** H. De Wever[1]; D. Pant[1]; [1] Flemish Institute for Technological Research (VITO), MOL/B	11:20
11:40	**Closing the loop: From waste and residues to bio-SNG** A. Varone[1]; [1] CRS4, Loc. Piscina Manna, Pula/I	**Combined Life Cycle Assessment of CO_2 and Biomass as Renewable Carbon Feedstocks for Polymers** M. Bachmann[1]; L. Müller[1]; B. Winter[1]; R. Meys[1]; A. Bardow[2]; [1] RWTH Aachen University, Aachen/D; [2] RWTH Aachen University and Forschungszentrum Jülich GmbH, Aachen/D	11:40
	Room: Brüssel		
12:10	**Closing remarks** (12:10 – 13:10) W. Leitner, RWTH Aachen/D, C. Song, Pennsylvania State University/USA		12:10

	Room: K 3	Room: K 4	
	CAPTURE AND SEPARATION	**LCA/TEA**	
	Chair: C. Song, Pennsylvania State University, University Park, Pennsylvania/USA	*Chair: A. Zimmermann, TU Berlin, Berlin/D*	
09:30	**Precipitation Study of the CO_2-loaded Glycinate Solution with the Introduction of Ethanol as an Antisolvent** S. Chen[1]; [1] , Qingdao University/CN	**Life cycle assessment of carbon capture and utilization by mineralization** H. Ostovari[1]; [1] RWTH, Aachen/D	09:30
09:50	**Optimisation of CO_2 Capture into Flowing Aqueous NaOH Solution** W. Pragot[1]; W. Afzal[1]; M. Imbabi[1]; F. Glasser[2]; [1] University of Aberdeen, School of Engineering/UK; [2] University of Aberdeen, School of Chemistry/UK	**Potentials and limits of Carbon Capture and Usage to close the carbon cycle in the German chemical and polymer sector** S. Kaiser[1]; S. Bringezu[1]; [1] University of Kassel, Kassel/D	09:50
10:10	**Improvement of CaO Sorbents Stability for Ca-Looping CO_2 Capture in the Cement Industry Using Coal Fly Ashes and Spent FCC Catalysts** P. Teixeira[1]; I. Mohamed[1]; A. Fernandes[1]; F. Ribeiro[1]; C. Pinheiro[1]; [1] CQE, Instituto Superior Técnico, Universidade de Lisboa, Lisboa/P	**Interpreting and Commissioning LCA and TEA** K. Armstrong[1]; H. Naims[2]; P. Styring[1]; [1] The University of Sheffield, Sheffield/UK; [2] IASS, Potsdam/D	10:10
10:30	Coffee break		10:30
	CAPTURE AND SEPARATION	**CO_2 TO CHEMICALS** CO_2 to methanol	
	Chair: O. Hurtig, DECHEMA e.V., Frankfurt am Main/D	*Chair: J. Boon, TNO, Petten/NL*	
11:00	**Integrating CCUS Technology into the UK's Hydrogen Agenda: Towards a Conceptual Framework** R. Edwards[1]; C. Palma[2]; T. Tomlinson[3]; [1] University of Chester, CHESTER/UK; [2] University of Chester, Chester/UK; [3] Costain, Manchester/UK	**Development of CO_2-to-Methanol at Air Liquide** T. Schuhmann[1]; [1] Air Liquide Forschung und Entwicklung Gm, Frankfurt/D	11:00
11:20	**CO_2 Capture at High Temperature and Low CO_2 Concentration Using Slag – Derived Lithium Silicates** B. Alcántar Vázquez[1]; R. Ramírez-Zamora[1]; [1] Instituto de Ingeniería, Universidad Nacional Autónoma de México, Mexico city/MEX	**Rational development of catalysts for CO_2 hydrogenation using design of experiments** D. Curulla-Ferré[1]; J. Stewart[1]; M. Frei[2]; C. Mondelli[2]; J. Pérez-Ramírez[2]; [1] Total, Feluy/B; [2] ETH, Zürich/CH	11:20
11:40	**The Carbon Dioxide Removal Potential of Liquid Air Energy Storage: a high-level technical and economic appraisal** A. Lockley[1]; [1] Andrew Lockley, Milton Keynes/UK	**Reduction of CO_2 to methanol using a supercritical flow process** M. Gothe[1]; A. L Figueredo[1]; M. Villegas[1]; L. Rossi[1]; P. Vidinha[1]; [1] University of Sao Paulo/BR	11:40
	Room: Brüssel		
12:10	**Closing remarks** (12:10 – 13:10) W. Leitner, RWTH Aachen/D, C. Song, Pennsylvania State University/USA		12:10

POSTER

P 1.1 **Metal-conjugated poly(triphenylamine) networks for CO_2 capture and electrochemical conversion**
V. Del Angel Hernandez[1]; G. Gobaille-Shaw[1]; D. Fermin[1]; C. Faul[1]; [1] University of Bristol, Bristol/UK

P 1.2 **Life-Cycle Assessment of Direct Air Capture (DAC) via Temperature-Vacuum Swing Adsorption**
S. Deutz[1]; A. Bardow[1]; [1] Institute of Technical Thermodynamics, RWTH Aachen University, Aachen/D

P 1.3 **Scalable synthesis of a novel Li_4SiO_4-based high-temperature CO_2 sorbent**
Y. Zhang[1]; Y. Gao[1]; Q. Wang[1]; [1] Beijing Forestry University, Beijing/CN

P 1.4 **Synthesis of Porous Mg/Chitosan/Sponge Composite for CO_2 sorption at elevated temperature**
Yi-Jiun Chen[1]; M.-C.Wu[1]; I-M. Shu[1]; C.-Y. Lu[1]; [1] Chung Shan Medical University, Taichung/RC

P 1.5 **CO_2 Capture by Aqueous NH_3 Combined with High Quality $CaCO_3$ Formation and Red Mud Neutralization**
F. Barzagli[1]; C. Giorgi[2]; F. Mani[1]; M. Peruzzini[3]; [1] CNR - National Research Council of Italy, Florence/I; [2] University of Florence, Department of Chemistry, Florence/I; [3] CNR - National Research Council of Italy, Rome/I

P 1.6 **Microwave-assisted regeneration of activated carbon and zeolite based adsorbents loaded with captured CO_2, capture process intensification**
M. Yassin[1]; [1] University of Aberdeen, Aberdeen/UK

P 2.1 **Thermochemical CO_2 split and methane partial oxidation through an oxygen carrier of $NiFe_2O_4$ in a perovskite shell**
H. Lim[1]; D. Kang[1]; M. Lee[1]; J. Lee[1]; [1] Korea Advanced Institute of Science and Technology (KAIST), Daejeon/ROK

P 2.2 **Production of syngas with an optimized ratio on the Ni-Fe_2O_3/Al_2O_3 by chemical looping partial oxidation with CH_4-CO_2 mixture feed**
D. Kang[1]; H. Lim[1]; M. Lee[1]; J. Lee[1]; [1] Korea Advanced Institute of Science and Technology (KAIST), Daejeon/ROK

P 2.3 **Single step room temperature activation of carbon dioxide with methane into liquid chemicals in a plasma-catalytic reactor**
L. Wang[1]; Y. Wang[1]; X. Tu[1]; [1] University of Liverpool, Liverpool/UK

P 3.1 **Cooperative catalysts for the selective synthesis of alkylidene cyclic carbonates from CO_2 and propargylic alcohols**
C. Ngassam[1]; B. Grignard[1]; C. Jérôme[1]; T. Tassaing[2]; C. Detrembleur[1]; [1] University of Liege, Liege/B; [2] université de bordeaux, Bordeaux/F

P 3.2 **Experimental Study on Synthesis of Precipitated Calcium Carbonate using Aqueous Amino Acid Salts**
K. Kim[1]; [1] Korea Institute of Industrial Technology (KITECH), Ulsan/ROK

P 3.3 **CO_2 mineralization with concentrated seawater: Chemical absorption-conversion method**
S. Park[1]; C. Jeon[1]; [1] Korea Institute of Geoscience and Mineral Resources, Daejeon/ROK

P 3.4 **The low-cost disposal and calcium carbonation of alkaline paper mill waste sludge by acid digestion and amine added mineral carbonation**
c. jeon[1]; [1] korea institutes of geoscience and mineral resources, yusung-gu, daejeon, south korea/ROK

P 3.5 **The economics of accelerated carbonation routes using captured CO_2**
T. Strunge[1]; H. Naims[1]; [1] IASS Potsdam, Potsdam/D

P 5.1 **Valorization of CO_2 using electrospun supported nickel – lanthanide catalysts**
A. Ferreira[1]; J. Branco[1]; [1] Centro de Ciências e Tecnologias Nucleares, IST, ULisboa, Bobadela/P

P 5.2 **Selective Anti-Markovnikov Hydrocarboxylation of Styrenes**
A. Alkayal[1]; [1] Loughborough University, Leicestershire/UK

P 5.3 **Hetero-Triphos Ligands in the Selective Ruthenium-Catalyzed Transformation of Carbon Dioxide to Dimethoxymethane**
M. Seibicke[1]; M. Siebert[1]; O. Trapp[1]; [1] LMU Munich, München/D

P 5.4 **The influence of Y doping on the catalytic performance of Cu-based catalyst via hydrogenation of CO_2 to methanol**
T. Qi[1]; S. Chen[2]; Y. Zhang[2]; [1] Dalian university of technology, Section B, Dpartment of Industrial Catalysis, School of Chemical Engineering, dalian university of technology/CN; [2] Dalian university of technology, Dalian/CN

P 5.5 **Density functional theory study on the reactivity of Cu/ZrO_2 in the hydrogenation of CO_2 to methanol**
S. Polierer[1]; J. Jelic[1]; S. Pitter[1]; F. Studt[1]; [1] Karlsruhe Institute of Technology (KIT), Karlsruhe/D

P 5.8 **CO_2-Insertion into Si-N Bonds of Aromatic Aminosilanes**
F. Gründler[1]; S. Schwarzer[1]; E. Kroke[1]; [1] TU Bergakademie Freiberg, Freiberg/D

P 5.9 **Mono-Insertion of CO_2 into Aminosilanes**
M. Baumhardt[1]; M. Herbig[1]; L. Gevorgyan[1]; S. Schwarzer[1]; E. Kroke[1]; [1] Technische Universität Bergakademie Freiberg, Freiberg/D

P 5.10 **CO_2-H_2O-co-Electrolysis to Formic Acid for Microbial Conversion**
M. Stoll[1]; E. Klemm[1]; A. Löwe[1]; [1] Universität Stuttgart, Stuttgart/D

ANZEIGE

P 5.11 **Selective Anti-Markovnikov Hydrocarboxylation of Dienes**
A. Sheta[1]; [1] Loughborough University, Loughborough, Leicestershire/UK

P 5.12 **COZMOS – Efficient CO_2 conversion over multisite Zeolite-Metal nanocatalysts to fuels and OlefinS**
R. Heyn[1]; U. Olsbye[2]; [1] SINTEF Industry, Oslo/N; [2] University of Oslo, Oslo/N

P 8.1 **Novel trends in flat panel photobioreactor´s designing**
L. Kratky[1]; [1] Czech Technical University in Prague, Faculty of Mechanical Engineering, Prague/CZ

P 8.2 **Bio-electrochemical reduction of carbon dioxide to methane in parallel with wastewater treatment**
M. Haberbauer[1]; S. Thallner[1]; H. Seelajaroen[2]; A. Ragossnig[3]; [1] ACIB GmbH, Linz/A; [2] LIOS-JKU, Linz/A; [3] RM Umweltkonsulenten ZT GmbH, Wien/A

P 9.2 **Mass transport effects in electrocatalytic CO_2 reduction on copper**
J. Geisler[1]; [1] Friedrich Schiller University Jena, Jena/D

P 11.1 **Controlling the Textural Properties of Mesoporous Zirconia for the Methanation of Carbon Dioxide**
K. Abel[1]; P. Seidel[1]; J. Titus[1]; R. Gläser[1]; [1] Universität Leipzig, Institute of Chemical Technology, Leipzig/D

P 11.2 **Advanced Microreactors for the Water-Gas Shift Reaction in the Jet Fuel Production from Plasma Splitting of CO_2**
T. Stadler[1]; F. Vidal Vázquez[1]; P. Pfeifer[1]; [1] Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen/D

P 12.1 **CO_2 as resource for carbon nanomaterials in high-tech and energy-related applications**
D. Müller[1]; M. Hiete[1]; [1] Universität Ulm, Ulm/D

P 12.2 **Multi-criteria decision methods for selecting Carbon Capture and Utilization pathways**
R. Chauvy[1]; R. LEPORE[1]; P. FORTEMPS[1]; D. Thomas[1]; G. De Weireld[1]; [1] UMONS, Mons/B

P 12.3 **TRL-based guidelines for early-stage evaluation of CO_2 utilization technologies**
K. Roh[1]; J. Burre[1]; D. Bongartz[1]; S. Lee[2]; W. Chung[2]; D. Han[2]; A. König[1]; S. Deutz[3]; A. Bardow[3]; J. Lee[2]; A. Mitsos[1]; [1] RWTH Aachen University, Aachener Verfahrenstechnik, Lehrstuhl für Systemverfahrenstechnik, Aachen/D; [2] KAIST, Department of Chemical and Biomolecular Engineering, Daejeon/ROK; [3] RWTH Aachen University, Lehrstuhl für Technische Thermodynamik, Aachen/D

GENERAL INFORMATION

CONGRESS OFFICE

Sunday, 23 June 2019	16:00 – 19:00
Monday, 24 June 2019	09:00 – 18:00
Tuesday, 25 June 2019	08:00 – 17:15
Wednesday, 26 June 2019	08:00 – 17:30
Thursday, 27 June 2019	09:00 – 12:30

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