

Materials Chain

Members' Assembly March 9, 2018

Materials Chain - An initiative within the framework of the University alliance (UA) Ruhr

Members' Assembly - March 9, 2018

Program

9:45 a.m.	Welcome Summary of Materials Chain's Past Activities and Future Plans Prof. Dr. Axel Lorke (Materials Chain Scientific Coordinator, University of Duisburg-Essen)
10:15 a.m.	Trend Study: Results and Discussion Prof. Dr.-Ing. Wolfgang Tillmann (Materials Chain Scientific Coordinator, TU Dortmund University)
10:45 a.m.	Coffee Break
11:15 a.m.	Perovskite Photovoltaics: Opportunities and Challenges towards a Sustainable Energy Future Dr. Michael Saliba (Soft Matter Physics, Adolphe Merkle Institute, University of Fribourg, Schweiz)
12:00 Noon	Chalcopyrite Solar Cells: Micro- and Nanooptical Concepts for Next Generation Photovoltaics Prof. Dr. Martina Schmid (Experimental Physics, Faculty of Physics, University of Duisburg-Essen)
1:00 p.m.	Lunch and Time for Networking and Discussions
1:30 p.m.	Internal Team Meeting "EXPLORE Materials Chain"

Past Activities

Initiators and Organisers of the Materials Chain

Scientific Coordinators at the three UA Ruhr university locations



Prof. Dr.
Axel Lorke
(Duisburg-Essen)



Prof. Dr.
Ralf Drautz
(Bochum)



Prof. Dr.-Ing.
Wolfgang Tillmann
(Dortmund)

Central facilitators UA Ruhr / MC



Dr. Hans
Stallmann

Administrative Coordinators at the university locations



Dr. Marion
Franke
(Duisburg-Essen)



Dr. Manuel
Piacenza
(Bochum)



Dr.-Ing. Ingor
Baumann
(Dortmund)

Backward Glance: MC activities in 2017

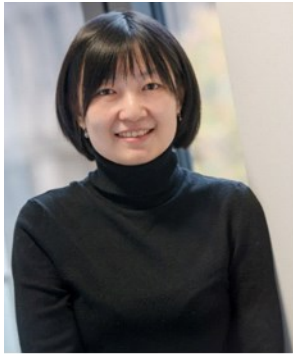
Facts and Figures: 20 new members in 2017

- Tong Li, RUB
- Fleurianne Betrand, UDE
- Yujiao Li, RUB
- Rolf Breitenbücher, RUB
- Sebastian Henke, TU Do
- Napat Vajragupta, RUB
- Christina Sengstock, RUB
- Aleksander Kostka, RUB
- Martina Müller, TU Do
- Roland Böhmer, TU Do
- Marc-Alexander Aßmann, TU Do
- Dina Fattakhova-Rohlfing, UDE
- Björn Sothmann, UDE
- Mirko Cinchetti, TU Do
- Axel Rosenhahn, RUB
- Martin Hoffmann, RUB
- Sulamith Frerich, RUB
- Ulf-Peter Apfel, RUB
- Daniel Balzani, RUB
- Barbara Saccá, UDE



Backward Glance: MC activities in 2017

Facts and Figures: 20 new members in 2017



Napat Vajragupta,
RUB



Christina
Sengstock, RUB



Aleksander
Kostka, RUB



Martina Müller,
TU Do



Roland Böhmer,
TU Do



Backward Glance: MC activities in 2017

Facts and Figures: 20 new members in 2017



Martin
Hoffmann, RUB



Sulamith Frerich,
RUB



Ulf-Peter Apfel,
RUB



Daniel Balzani,
RUB



Barbara Saccá,
UDE

Backward Glance: MC activities in 2017

Facts and Figures: Alumni 2017

No longer affiliated with UA Ruhr:

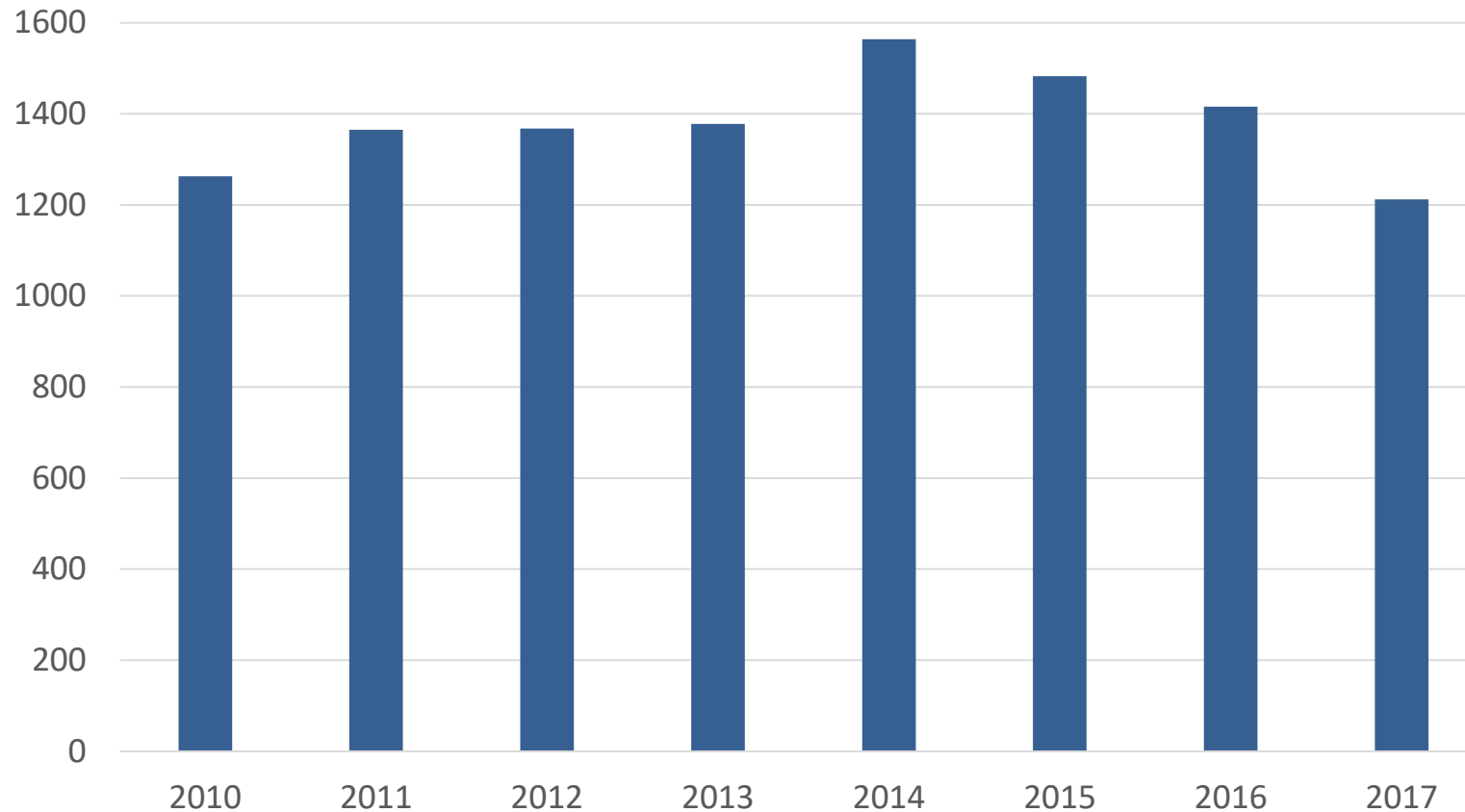
- Dr. Thomas A. J. Kuhlbusch
 - Bundesanstalt für Arbeitsschutz und Arbeitsmedizin
- Prof. Dr. Beatriz Roldán Cuenya
 - Fritz Haber Institut Berlin
- Dr. Torsten Textor
 - Hochschule Reutlingen
- Dr. Roman-Marius Mittendorf
 - WABCO Vehicle Control Systems
- Dr. Thomas Wiederkehr

Departed for other reasons:

- Dr. Ursula Selvadurai-Laßl
- Prof. Dr. Katharina Morik

Backward Glance: MC activities in 2017

Facts and Figures: Publications



Numbers for 2017 according to Scopus search request in November 2017. To be updated.

Backward Glance: MC activities in 2017

Events: Hannover Messe (April 24-28, 2017)

- Representing the flagship program Materials Chain for the second time
- With over 100 exhibits from the three UA Ruhr universities
- Most popular exhibits:
 - Ferrofluid well
 - Interactive NiTi-shape-memory alloy actor model
 - Fuel cell vehicle
 - Structured thin film elements
 - Prototypes made of vulcanized fiber
- VIP visitor: Dr. Martin Grünewald, Secretary of State NRW



Backward Glance: MC activities in 2017

Events: Workshops & Seminars

Workshops:

- *Gas-phase Synthesis of Functional Nanomaterials*
 - March 21-22, 2017
- *Modelling and Simulation of Superalloys 2017*
 - March 27 – April 03, 2017
- *4. RUHR-Symposium Funktionale Materialien für Batterien*
 - October 12, 2017

Other Activities/Events:

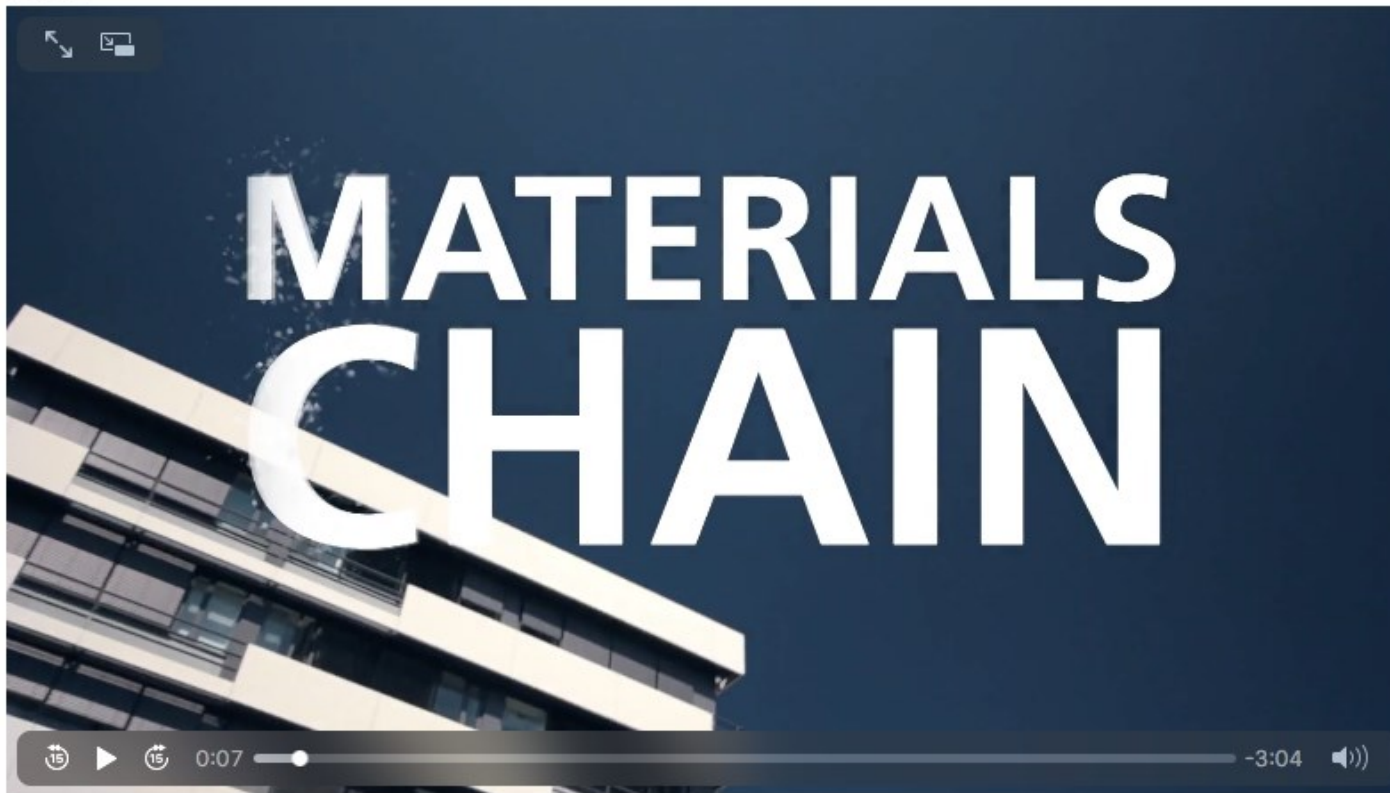
- **140** events organized by Materials Chain members and announced on the Materials Chain website



Materials Chain: Image Movie

Materials Chain on Screen

Learn what the chancellors of the three UA Ruhr universities have to say about the Materials Chain in the video below:



Source: <http://materials-chain.com/about/>

Backward Glance: MC activities in 2017

Strategy & Studies

Strategy paper/Strategiepapier

- „Strategie 2025“ finalized
- handed to rectorates in early 2017

Trend study & bibliometric study

- Completed
- Detailed report: by W. Tillmann in the next talk



Strategie 2025

UA Ruhr Profilschwerpunkt „Materials Chain“

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Backward Glance: MC activities in 2017

New Research Projects

- Collaborative Research Centres
 - TRR 188: Damage Controlled Forming Processes (Coordination: TU Do; 2017-2020)
 - SFB 1316: Transient atmospheric plasmas – from plasmas to liquids to solids (2018-2021)
- Priority Programmes
 - SPP 1980: Sprayflame Synthesis (Coordination: UDE; 2017-2020)
 - SPP 2122: Materials for Additive Manufacturing (Coordination: UDE; 2019- 2021)
- Mercator Research Center Ruhr
 - Analyse des Produktentstehungsprozesses bei der Kombination additiver und subtraktiver Fertigungsverfahren für die Herstellung von Multimaterialprodukten (2018-2019)
 - SESOX - Synthesegestützte Einstellung der Sauerstoffdefektdichte für halbleiter- und spinell-basierte selektive Oxidationskatalysatoren (2017-2018)
 - Synthese von maschinellem Lernen und numerischer Simulation zur Echtzeitsteuerung von Tunnelvortriebsprozessen (2017-2019)
 - UED@DELTA: Konzeption einer Femtosekunden-MeV-Elektronenquelle bei DELTA für zeitaufgelöste Beugungsexperimente (2017-2020)
- CORDIS
 - ERC: hyControl – Coherent optical control of multi-functional nano-scale hybrid units (2017-2021)

Backward Glance

MC-Ruhr

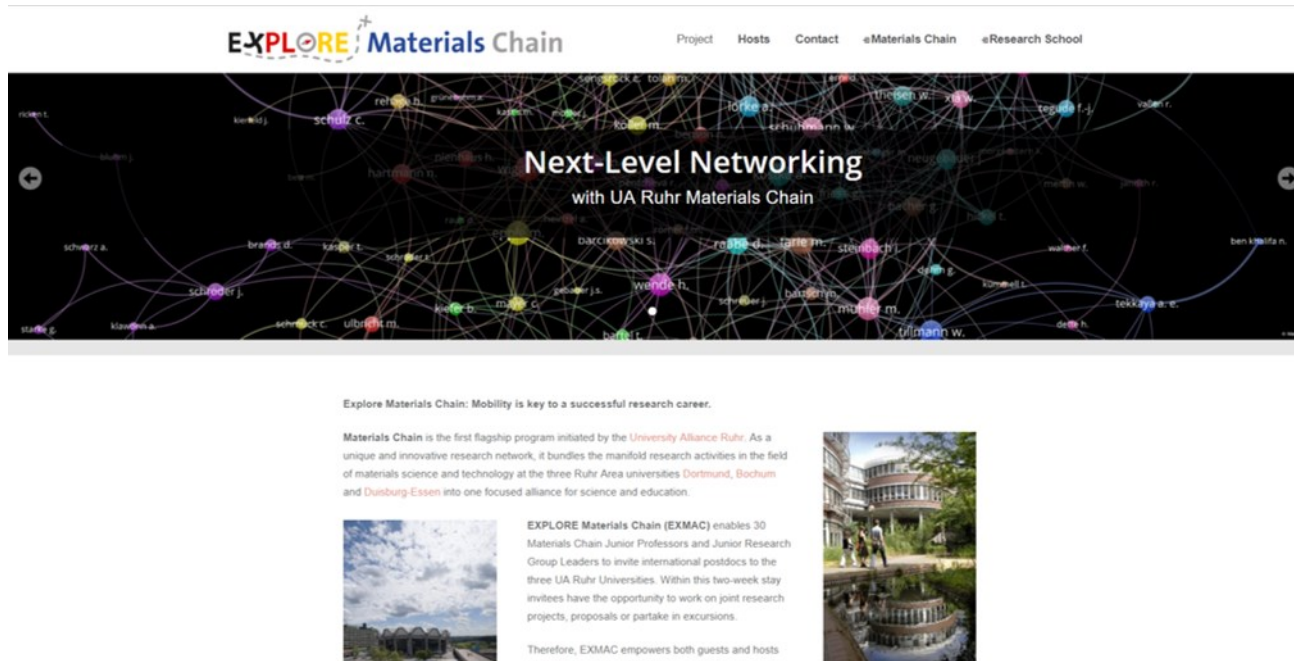
- Cluster of Excellence proposal
- Applicants:
 - Prof. Dr.-Ing. Gunther Eggeler (RUB)
 - Prof. Dr. Christof Schulz (UDE)
 - Prof. Dr.-Ing. Erman Tekkaya (TU Do)



Backward Glance: MC activities in 2017

EXPLORE Materials Chain (EXMAC)

- Joint research proposal of RUB, UDE and TU Do together with Research Academy Ruhr (RAR)
- Enables 30 Materials Chain Junior Professors and Junior Research Group Leaders to invite international postdocs to the three UA Ruhr Universities for a two-week stay
- Work on joint research projects, proposals or partake in excursions



The screenshot shows the EXPLORE Materials Chain website. At the top, there is a navigation bar with links: Project, Hosts, Contact, Materials Chain, and Research School. The main content area features a large network diagram with the title "Next-Level Networking with UA Ruhr Materials Chain". Below the diagram, there is a section titled "Explore Materials Chain: Mobility is key to a successful research career." which includes a paragraph about the Materials Chain program and a list of participating universities: Dortmund, Bochum, and Duisburg-Essen. To the right of the text, there are three small images: a landscape with a bridge, a building, and a group of people.

EXPLORE Materials Chain (EXMAC) enables 30 Materials Chain Junior Professors and Junior Research Group Leaders to invite international postdocs to the three UA Ruhr Universities. Within this two-week stay invitees have the opportunity to work on joint research projects, proposals or partake in excursions.

Therefore, EXMAC empowers both guests and hosts

Backward Glance: MC activities in 2017

New Webdesign

- Updated in autumn 2017
- Publications: Optimized search functions
 - Keyword cloud
 - Searching all fields enabled (Title, Abstract, Journal)
- Intuitive event calendar
- Interactive networking map: keywords from MC publication output 2010-2017
- Improvements planned:
 - Networking map: MC-researchers' network
 - More intuitive navigation

The screenshot displays the Materials Chain website's new design. At the top, a navigation bar includes links for Home, About, Members, Research, Publications, News & Events, and Education. The main header features a large image of a modern building with the text: "The core of the Materials Chain network are its 250 members: Scientists from various fields of materials-related research" and a button to "LEARN MORE ABOUT OUR MEMBERS".

Below the header, there are several content sections:

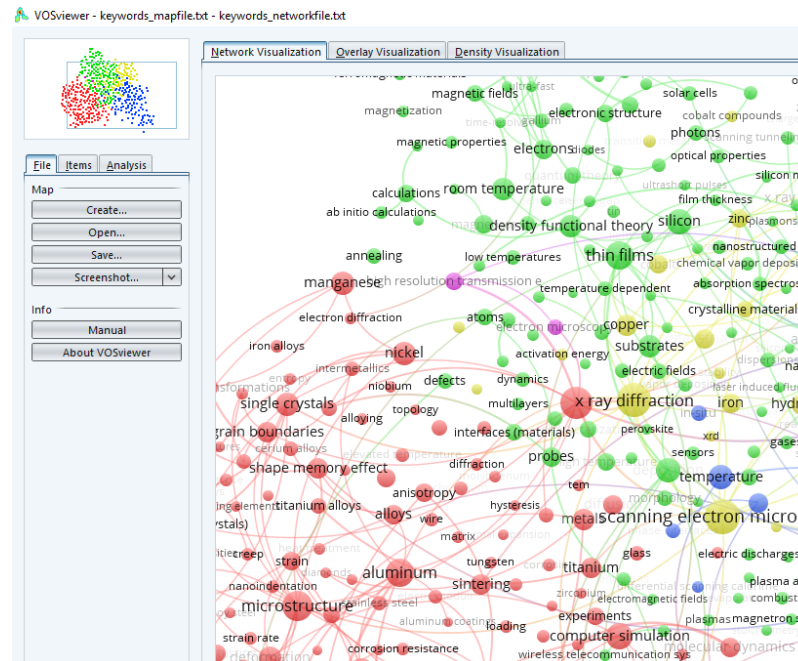
- Background:** A sidebar with links to THE RUHR AREA: A REGION OF MATERIALS SCIENCE, SPECIALISATION, SYNERGIES, and MATERIALS CHAIN ON SCREEN.
- The Ruhr Area: A Region of Materials Science:** A map of the Ruhr Area with text explaining its industrial history and its role as a center for materials science.
- Keyword Cloud:** A cloud of terms related to materials science, including "Nanoparticles", "electron microscopy", "X-ray diffraction", "chemistry", "computer simulation", "controlled study", "deformation", "density functional theory", "deposition", "electrodes", "finite element method", "cost", "biocompatible", "human", "hydrogen", "nickel", "nanoparticles", "microstructure", "silicon", "silver", "single crystals", "synthesis", "chemical", "temperature", "thermodynamics", "thin films", "stainless", "transmission", "electron microscopy", "unclassified drug", "x-ray photoelectron spectroscopy", and "OR".
- Publication List:** A list of recent publications with details such as title, authors, journal, and DOI. Examples include:
 - 2018-11: Elastic properties and plastic deformation of TiC- and VC-based pseudobinary alloys. Edström, D. and Sangiovanni, D.G. and Hultman, L. and Petrov, I. and Greene, J.E. and Chirita, V. *Acta Materialia* 144 376-385 (2018). DOI: 10.1016/j.actamat.2017.10.047.
 - 2018-10: Variational approach to interface element modeling of brittle fracture propagation. Khramov, I. and Mischke, G. *Computer Methods in Applied Mechanics and Engineering* 328 452-476 (2018). DOI: 10.1016/j.cma.2017.08.031.
 - 2018-9: Combinatorial Alloy Design by Laser Additive Manufacturing. Knoll, H. and Ocylok, S. and Weisheit, A. and Springer, H. and Jägle, E. and Raabe, D. *Steel Research International* 88 (2018). DOI: 10.1002/srin.201800446.
 - 2018-8: Thermal activation parameters of plastic flow reveal deformation mechanisms in the Cr/NiFeC. Laplanche, G. and Borneville, J. and Varvenne, C. and Curtin, W.A. and George, E.P. *Acta Materialia* 143 257-264 (2018). DOI: 10.1016/j.actamat.2017.10.014.
 - 2018-7: Hydrogen and oxygen trapping at the H-cluster of [FeFe]-hydrogenase revealed by site-selective. Hebs, S. and Kostzki, R. and Duan, J. and Kertész, L. and Senozar, M. and Wittkamp, F. and Apfel, U.-P. (in press).
- Materials Chain Events:** A section for upcoming events, including:
 - UPCOMING EVENTS:** Digital material microstructures by means of tomography for simulation models. Marion Bartsch, DLR Köln, Ruhr-Universität Bochum. 1st. March 2018, ICAMS Special Seminar, Ruhr-Universität Bochum IC 04 408.
 - 26th Annual Meeting of the German Crystallographic Society (DGK). Prof. Dr. Matthias Epple, Universität Duisburg-Essen. 5th. March 2018, Tagung, Universität Duisburg-Essen Universitätsstraße 2 Gebäude 504 Hörsaalzentrum 4541 Essen.
 - Materials Chain Members' Assembly 2018.
- EVENT CALENDAR:** A calendar for February 2018, showing dates from Monday to Sunday. The calendar is currently set to February 2018.

Backward Glance: MC activities in 2017

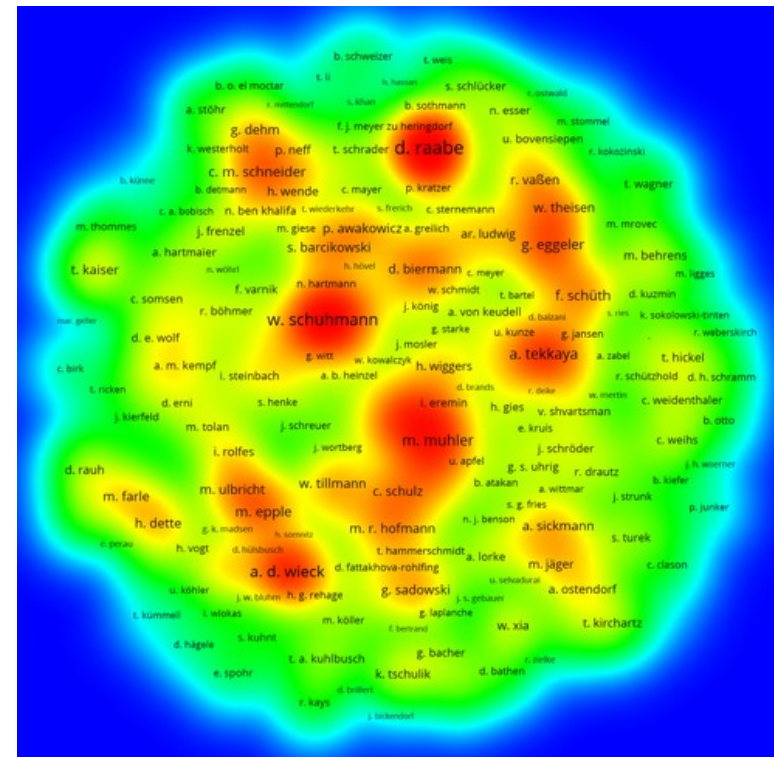
Visualization Tool: VOSviewer

New tool made accessible

- Based on **bibliographic data**, interactive network maps can be created and visualized
- Enables flexible network analyses
- **MC webteam can prepare individual networks upon request (might be useful for SFB assessments etc.)**



Example I: visualization of MC member network based on co-authored publications



Example II: visualization of research topics based on keywords found in Materials Chain publications from 2010 -2017



Future Plans

- On November 30, 2017, the Materials Chain successfully won the ideas competition from the DFG with the young scientists funding program: **EXPLORE Materials Chain (EXMAC)**
- **Goals**
 - ➔ Improving the **international visibility** and increasing international research cooperation of UA Ruhr's **early career scientists** in the area of **materials science** and **technology**.
 - ➔ Making the Ruhr Area **more attractive** for **international researchers**
- **Roadmap**
 - ➔ **30 MC junior researchers** are able to invite **international postdocs** to their respective campuses and **promote the research area Ruhr** and Germany for further **collaboration**.
 - ➔ Within a two-week (29 October - 11 November 2018) stay, invitees have the opportunity to **work on joint research projects** and **funding proposals** with their hosts, take part in **excursions** to explore the area as a potential future space to live, and make use of various **networking** events to get in contact with aspiring researchers from all over the world.
 - ➔ Own session on the **MCIC 2018**
- **Participants**
 - ➔ Materials Chain (UDE, RUB, TU Do)
 - ➔ Research Academy Ruhr
 - ➔ UA Ruhr

EXPLORE Materials Chain

 IDEENWETTBEWERB
INTERNATIONALES
FORSCHUNGSMARKETING
2017

DFG

2. MCIC Conference 2018

Second international Materials Chain Conference

12. - 14. November 2018

Conference Center, Ruhr-University Bochum

Invited speakers & program

■ Functional and Structural Characterization

- Dr. Robert Kostecky, Lawrence Berkeley National Laboratory, USA
- Professor Michael Moody, University of Oxford, U.K.
- Professor Aaron Stebner, Colorado School of Mines, Golden, USA

■ Modelling and Simulation

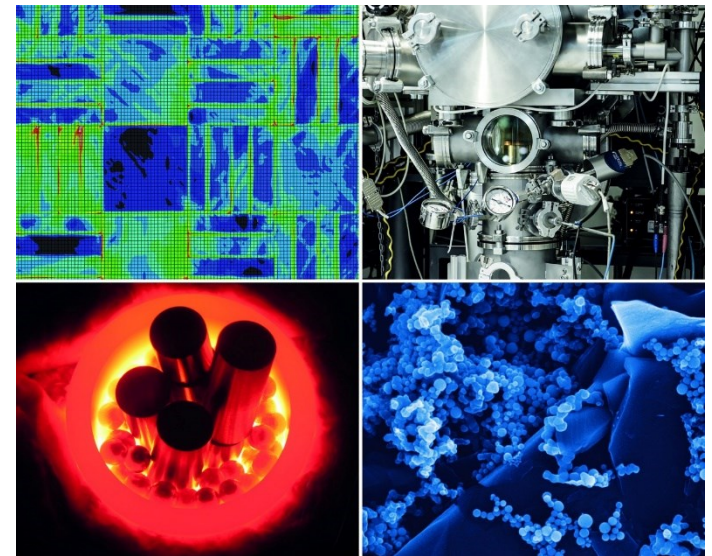
- Professor Esteban Busso, LEM ONERA, Palaiseau, France
- Professor Stefano Cutarolo, Duke University, Durham, USA
- Professor Olle Erikson, Uppsala University, Sweden

■ Processing and Synthesis

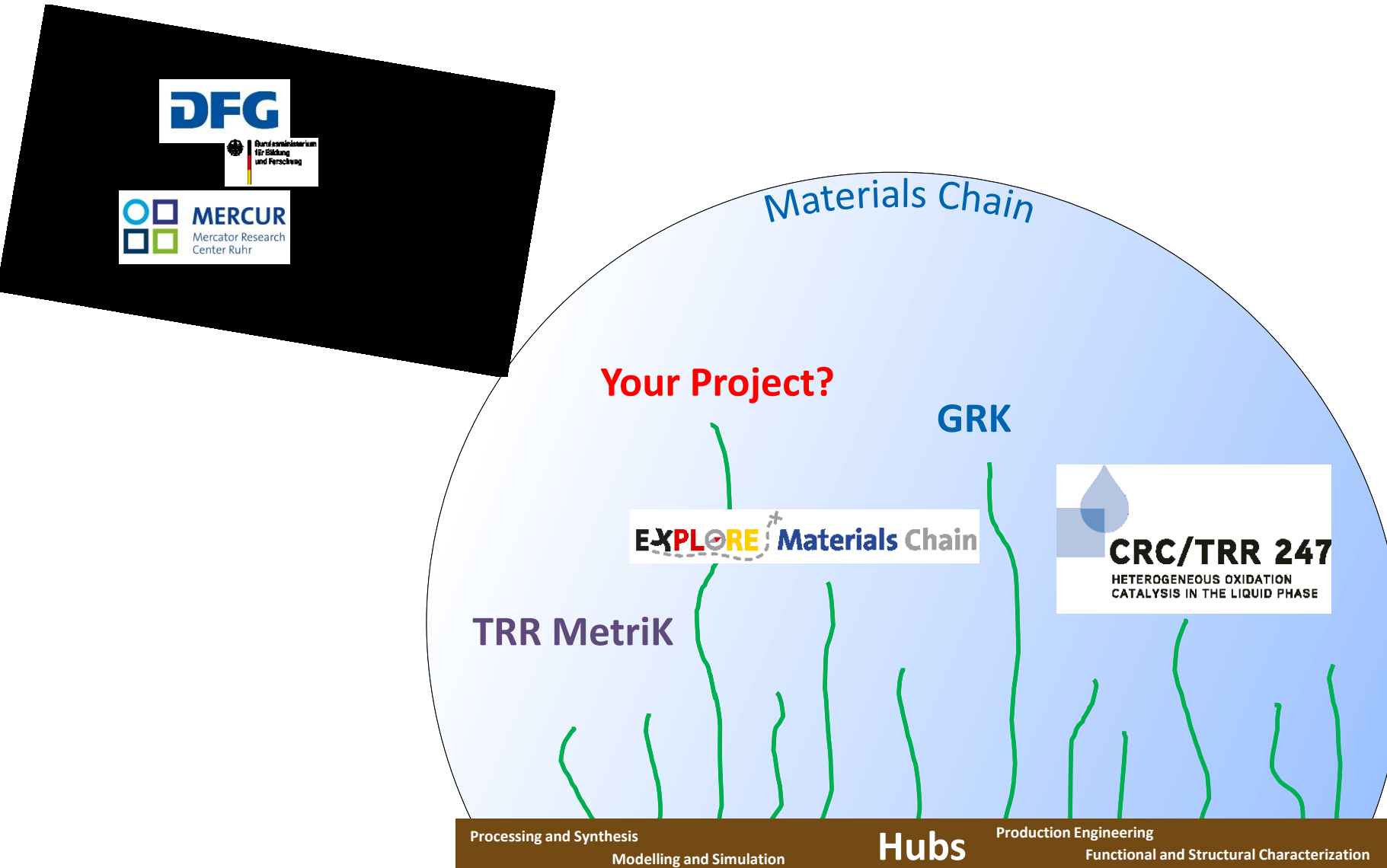
- Professor Evelyn Hu, Harvard, Cambridge, USA
- Professor Olli Ikkala, Aalto University, Finland
- Professor Jeffrey Snyder, Northwestern, Evanston, USA
- Professor Ichiro Takeuchi, University of Maryland, College Park, USA

■ Production Engineering

- Professor Niels Bay, Technical University Denmark, Copenhagen, Denmark
- Professor Hans-Jürgen Maier, Leibniz Universität Hannover, Germany



„The Glashouse Effect“ – joint research proposals



Offer for MC Members: Presentation on Materials related Fairs and Conferences?

- **Werkstoffwoche 2019, Dresden, 18.09.2019 - 20.09.2019**
Fachmesse und Kongress für innovative Werkstoffe, Verfahren und Anwendungen
- **COMPOSITES EUROPE 2018, Stuttgart, 06.11.2018 - 08.11.2018**
Europäische Fachmesse und Forum für Verbundstoffe, Technologie und Anwendungen.
- **Materialica, München, Oktober 2018, 2019, ... (genaue Termine stehen noch nicht fest)**
Internationale Fachmesse für Werkstoffanwendungen, Oberflächen und Product Engineering mit Kongress
- **Messequartett GIFA - METEC - NEWCAST - THERMPROCESS 2019, Messe Düsseldorf, 25.06.2019 - 29.06.2019**
GIFA, METEC, NEWCAST und THERMPROCESS finden zeitgleich statt



Staff (226.057 €)

- Administrative coordinators (Baumann, Franke, Piacenza)
- Support for excellence strategy proposal

Materials + Equipment (33.219 €)

- Movies (Image and Detail Movie)
- Travel expenses
- Printing/media
- Meetings + workshops
- Public relations / trade fair
- Support Workshops

→ the same and „safe“ for 2018!