Bayer MaterialScience

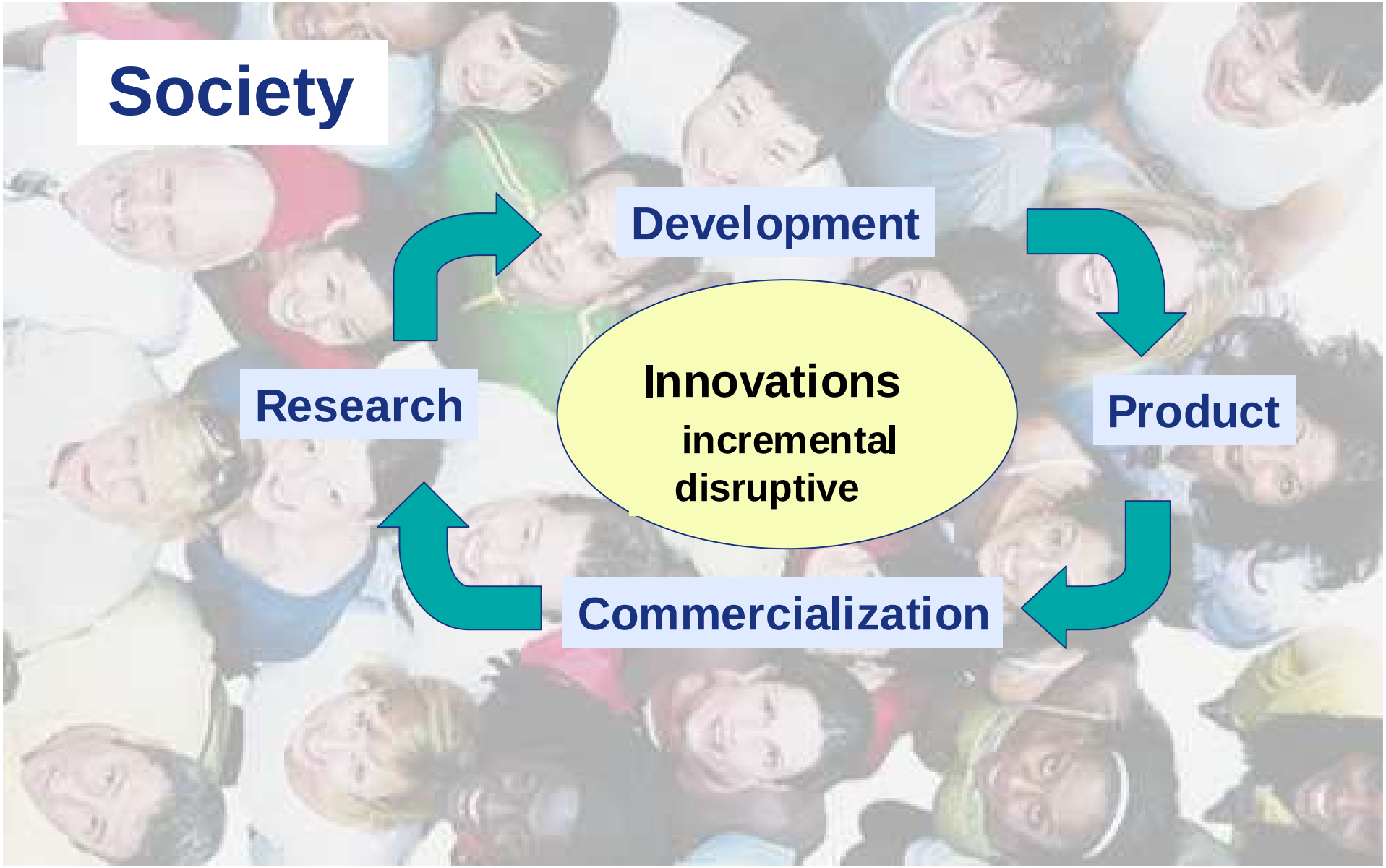
Safety research as an integral part of the industrial innovation strategy

Dr. Péter Krüger
Bayer Working Group Nanotechnology

Washington, March 2011

Working Group Nanotechnology

Innovation for the society - Research, Development and viable Commercialization:



Urgent Societal Needs and Challenges
Nanotechnology as a Cross-Sectional Platform

Energy

Conversion
Transport
Storage
Saving

Environment/Climate

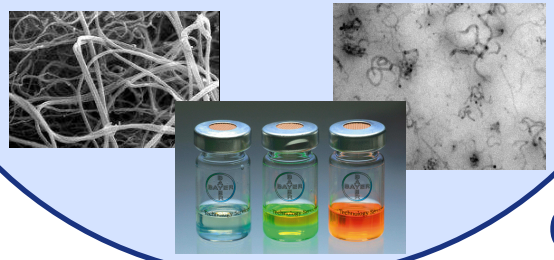
Decontamination:
-air
-soil
-water
Renewables

Resources

Saving, Efficiency
Catalysis,
Corrosion
protection

Nanotechnology

Nano-objects,
Nano-container
Nano-composites,
Nano-materials
Nano-structures

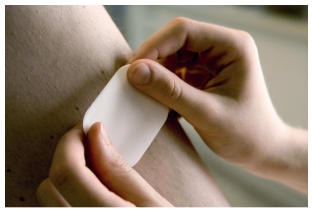


Mobility

Ground transportation
Aerospace
Marine

Health

Recovery:
-Drug delivery
-Controlled release
-Diagnostics
-Med. techn./equipments
Care/Conservation:
-Hygiene
-Sun protection

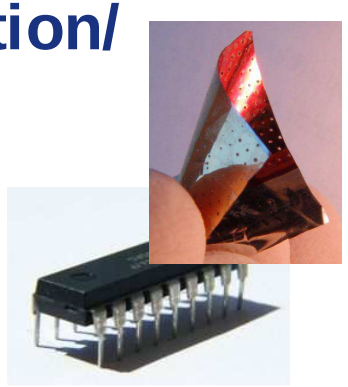


Nutrition

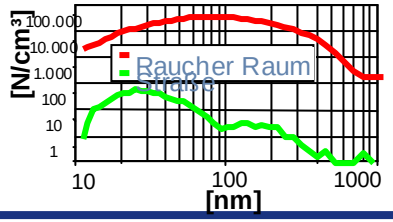
Plants / Crops
Clean water

Communication/ Information

Data storage
Data processing
Displays



Product Stewardship for Nanomaterials at Bayer



Research and testing for the evaluation of exposure and bio activity profiles

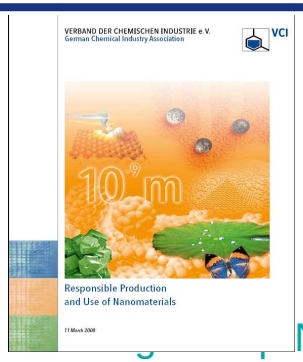
Development and validation of Methods and Characterization

Participation in public supported safety projects: NanoCare, TRACER, CarboSafe

Participation in associations: e.g. DECHEMA, VCI, CEFIC, ACC

Support globally harmonized standardization (ISO, OECD)

Participation on Dialog with Stakeholders



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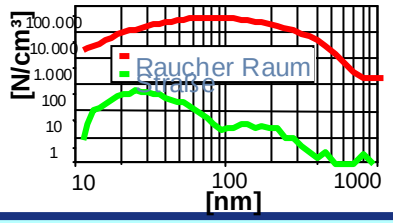

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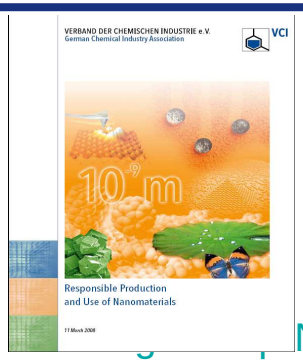

Research and testing for the evaluation of exposure and bio activity profiles:

Make sure that the nanomaterials produced by the company are safe in their intended applications along their life cycle

- Metrology
- Safety studies / standard operation procedures / preparation
- Occupational exposure limits
- Exposure measurements at the workplace
- MSDS

Research and testing for the evaluation of exposure and bio activity profiles:

Abstract Figures/Tables (14)

Toxicology
Volume 266, Issues 1-3, 21 December 2009, Pages 16-29

doi:10.1016/j.tox.2009.10.007 | How to Cite or Link Using DOI

Pulmonary toxicity of multi-walled carbon nanotubes (Baytubes®) relative to α-quartz following a single 6 h inhalation exposure of rats and a 3 months post-exposure period

Heidrun Ellinger-Ziegelbauer[a] and Jürgen Pauluhn[a,]

[a]Institute of Toxicology, Bayer Schering

Regulatory Toxicology and Pharmacology 57 (2010) 78–89

Contents lists available at ScienceDirect

Regulatory Toxicology and Pharmacology

journal homepage: www.elsevier.com/locate/yrtph

Multi-walled carbon nanotubes (Baytubes®): Approach for derivation of occupational exposure limit

Jürgen Pauluhn *

Institute of Toxicology, Bayer Schering Pharmaceuticals, 42096 Wuppertal, Germany

On behalf of the Occupational and Public Health Specialty Section (OPHSS) of the Society of Toxicology (SOT), I am pleased to wish you congratulations that your paper, "Multi-walled carbon nanotubes (Baytubes): approach for derivation of occupational exposure limit", has been selected for the **"SOT OPHSS Best Paper of the Year Award" for 2010.**

Anne Chappelle, Ph.D. DABT
Councilor - OPHSS

hnology

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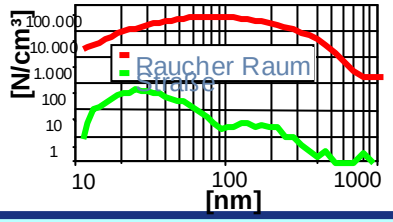

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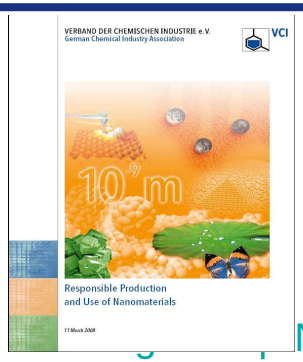

Participation in public supported safety projects including of methods and characterization :

Collaboration in large public funded safety and characterization/measurement related projects consisting of partner from industry and academia

- NanoCare
- TRACER
- CarboSafe within Inno.CNT
- NanoGEM
- Carbo Life Cycle within Inno.CNT
- CarboTox

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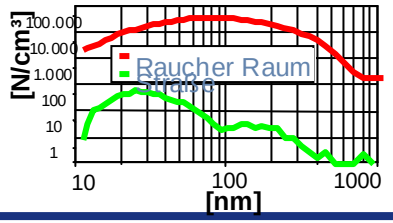
Product Stewardship for Nanomaterials at Bayer



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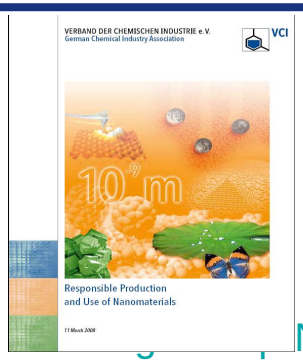

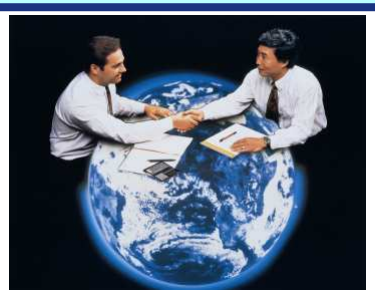

Support globally harmonized standardization :

Participation in different national and international organizations and working groups taking care of globalized harmonization:

- DIN
- CEN
- ISO (especially TC 229)
- OECD WPMN (contributor for MWCNT)

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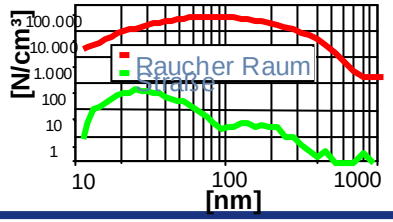

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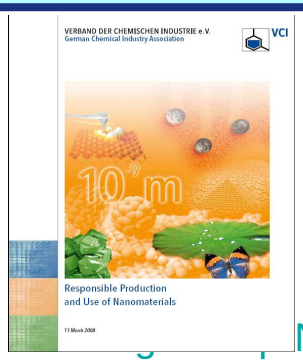

Nanotechnology

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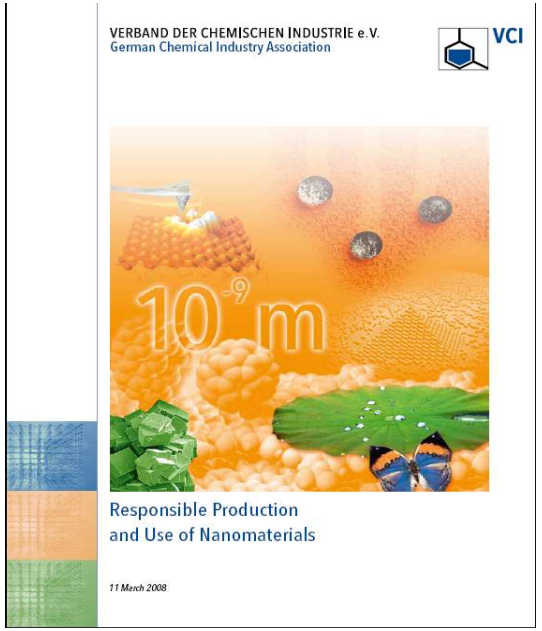
Participation in associations :

Make sure that industry widely follows high standards with respect to safe handling and use of nanomaterials along their life cycle:

- VCI BAuA guidelines among other such as „Responsible use and production of nanomaterials“
- DECHEMA/VCI Working Group „Reponsible use and production of nanomaterials
- ACC
- CEFIC
- ICCA
- NANO*futures* WG Industrial Safety Strategy



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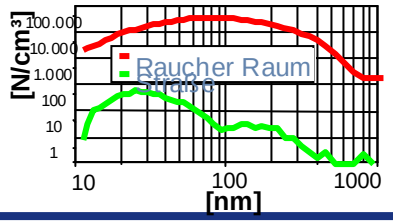

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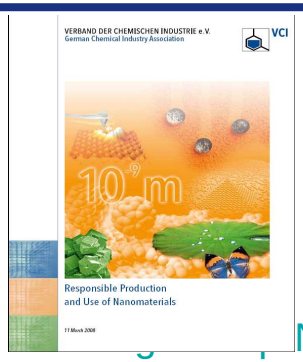
Participation on Dialog with Stakeholders



Dialog with stakeholders :

Communicate about potential benefits of the safe and responsible use of nanomaterials to address societal challenges:

- Communicate about safety issues openly:
  - MSDS for the value chain
  - Publish results of internal safety research
  - Code of Conduct / Position Paper
- Participation in the „NanoDialog" of the German Government
- Participation on workshops with stakeholder organized by:
  - Consumer Groups
  - Unions
  - Churches
- Direct Dialog with Stakeholder
- Participation on Conferences

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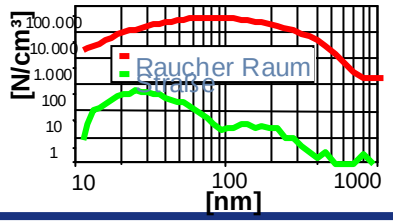

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BAYER

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Support globally harmonized standardization (ISO, OECD)

Participation on Dialog with Stakeholders

Safety research is an essential part of the innovation - strategy

Example for integrated safety research Innovation Alliance CNT
Key Figures

- Goals
  - Responsible research and development of basic technologies and applications for CNT based products
  - Contributions to the development of fundaments for sustainable lead markets for CNT based products
- Budget of the Alliance: ca. 90 Mio. €
- Governmental (BMBF) support ca. 50%
- 90 partner from industry and academia in 27 inter-linked projects including **two projects related to safety and life cycle considerations**
- Runtime: 2008 - 2014
- Information: www.inno-cnt.de

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Federal Ministry of Education and Research

Innovation Alliance CNT:
Cross-sectional platform technologies as a basic fundaments for application projects
Safety research is included from the beginning

Cross-sectional technologies

CarboScale: Synthesis/Catalysis

SWCNT | MWCNT | CNF

CarboFunk: Functionalization

Gas phase | Fluid phase | Plasma

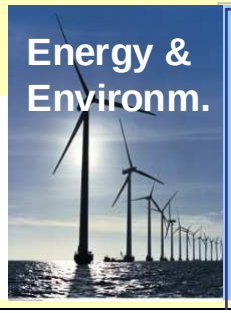
CarboDis: Dispersion / Intermediates

Thermoplastics | Elastomer | Duroplasts

CarboSafe/CarboLife Cycle: Health, Environment and Safety

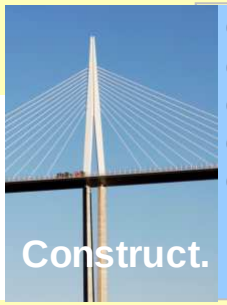
Applications

Applications

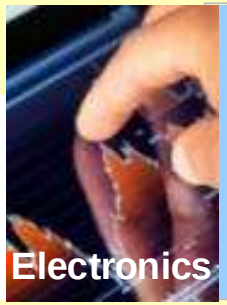


CarboPlate
CarboFuel
CarboPower
CarboMemb.
CarboInk
CarboElch
CarboKat

CarboAir
CarboCar
CarboSpace
CarboRoad
CarboShield
CarboSlide



CarboTube
CarboElast
CarboBau
CarboMetal
CarboProtekt



CarboFilm
CarboTCF
CarboFEM
CarboAktiv

Thanks for your attention!

Nanotech is Powerful

Working Group Nanotechnology

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Acknowledegements

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