

---

# INVENTING, PATENTING AND COMMERCIALISATION - A PRACTICAL EXAMPLE

---



Dr. Heribert Schmidt

Fraunhofer Institute for Solar  
Energy Systems ISE, Freiburg

WIPO- Conference on  
Green Technologies - IP

Bonn, 06. Sept. 2013

[www.ise.fraunhofer.de](http://www.ise.fraunhofer.de)

---

# AGENDA

---

- Introduction
- The Fraunhofer-Gesellschaft
- The Fraunhofer ISE
- Fraunhofer patent strategy
- The HERIC patent
- Lessons learned
- Summary

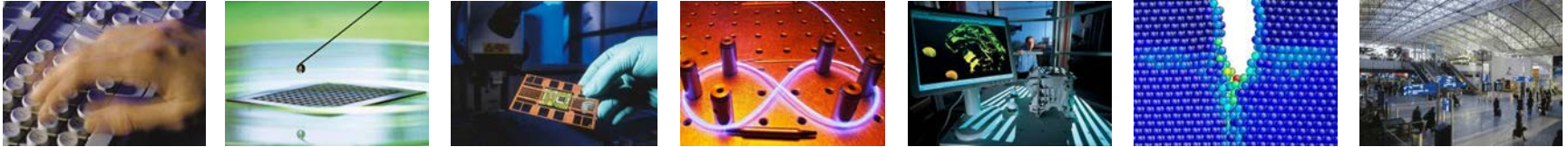
# Dr.-Ing. Heribert Schmidt

- PhD in Electrical Engineering at RWTH Aachen
- Systems Engineer at DORNIER Systemtechnik
- Since 1988 with Fraunhofer ISE, Freiburg
- PV-Systems technology (from  $\mu\text{W}$  to MW)
- Since 1995 lecturer at Univ. Karlsruhe (KIT)
- Fellow Fraunhofer ISE
- Joseph-von-Fraunhofer-Prize in 2011
  
- More than 20 patents granted
- Licence income from 5 different patents



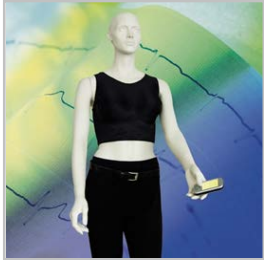
HERIC® topology reduces losses by half in PV inverters

# The Fraunhofer-Gesellschaft



- Leading non profit organisation for applied research in Europe
- Customers: industry, private and public enterprises, public administration
- Over 22.000 employees
- 66 research institutes in Germany, international subsidiaries
- Annual research budget > 1.9 billion Euros
- 1.6 billion Euros generated through contract research

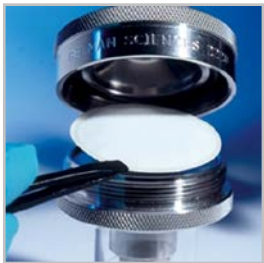
# Frontline themes **Tomorrow's opportunities**



Assisted Personal **Health**  
**The electronic guardian angel**



Decentralized integrated **water management**  
**Saving precious water**



Bio-functional surfaces  
**High tech with a sensitive skin**



Energy-efficient **modernisation**  
**More than just a facade**

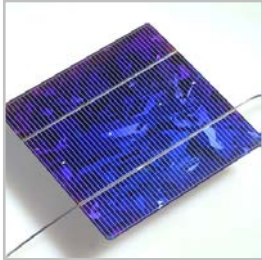


Food chain management  
**Always fresh on the table**



Solid-state light sources  
**Bright and efficient illumination**

# Frontline themes **Tomorrow's opportunities**



Energy storage in power grids  
**Solar and wind-generated electricity on demand**



Visual analytics  
**A clear overview in the data jungle**



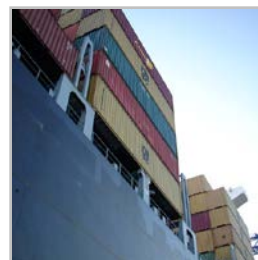
Green powertrain technologies  
**New impetus for eco-friendly cars**



Hybrid material structures  
**Combining the best of the best**



Energy self-sufficient sensors and sensor networks  
**Vigilant clusters**



Integrated localization technology  
**On the move – quick and safe**

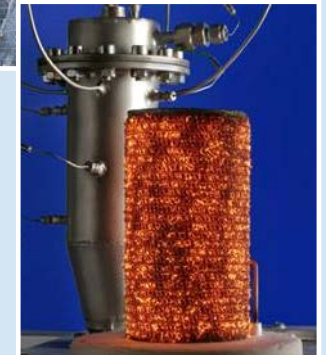
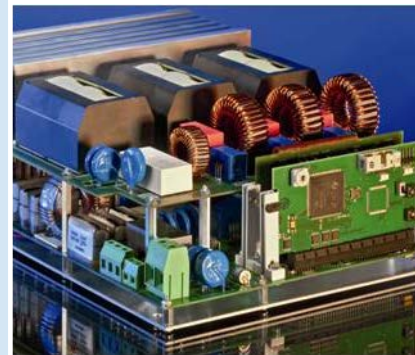
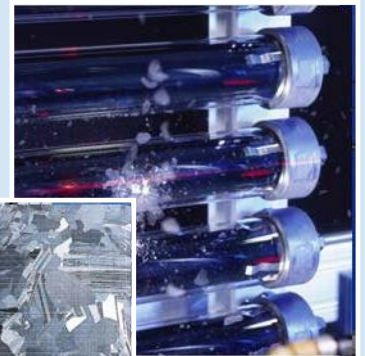
# Fraunhofer Institute for Solar Energy Systems ISE

- Established: 1981  
Prof. Adolf Goetzberger
- Director:  
Prof. Eicke R. Weber
- Staff: 1270
- 2012 Budget: € 77 million



# Areas of Business at Fraunhofer ISE

- Energy Efficient Buildings
- Applied Optics and Functional Surfaces
- Solar Thermal Technology
- Silicon Photovoltaics
- Photovoltaic Modules and Systems
- Alternative Photovoltaic Technologies
- Renewable Power Supply
- Hydrogen Technology





# Concentrating Competence through Networking

## Fraunhofer ISE Memberships in Fraunhofer Alliances

 Fraunhofer Energy Alliance  
Member-in-Charge, Administrative Office

 Fraunhofer Battery Alliance

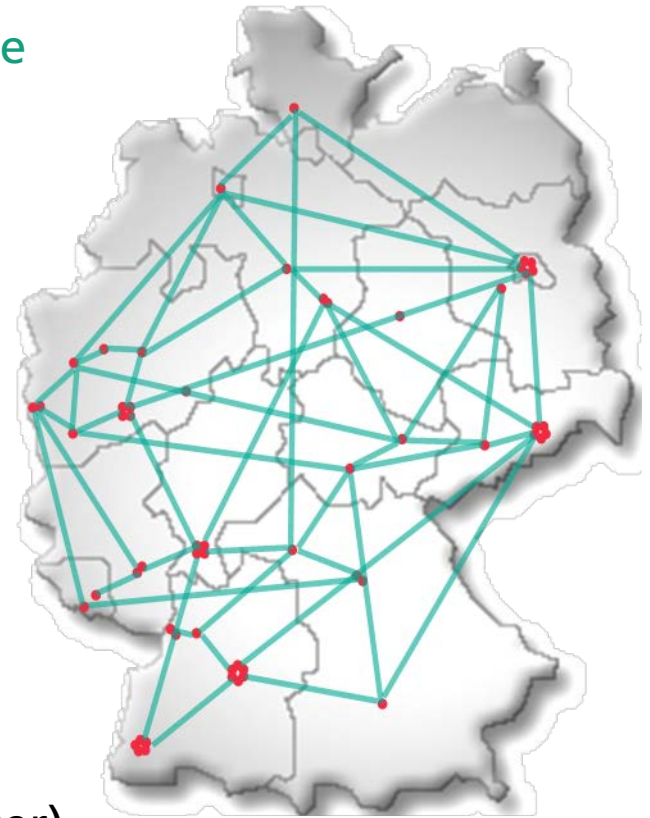
 Fraunhofer Building Innovation Alliance

 Fraunhofer Nanotechnology Alliance

 Fraunhofer Optic Surfaces Alliance

 Fraunhofer Photocatalysis Alliance

 Fraunhofer Water Systems Alliance (Syswasser)



# Why is Fraunhofer interested in patents?

- Fraunhofer is a “think tank”
- Fraunhofer is not producing or selling goods
- Fraunhofer is not interested in forbidding technologies

# Strategic aims of Fraunhofer for its patents

- Using patents for **earning money** (licencing, R&D projects, spin offs)

- **Motivation** of employees



- Protection of **advantages in competition** for Fraunhofer's customers / licence holders



- **Avoiding infringement** of patents of third parties



- **Access** to interesting technologies of third parties



- Using patents for **transfer of scientific results** into industry

- **Image** of research close to application ("leading edge technologies")

# The most active patent applicants 2012 (DPMA)

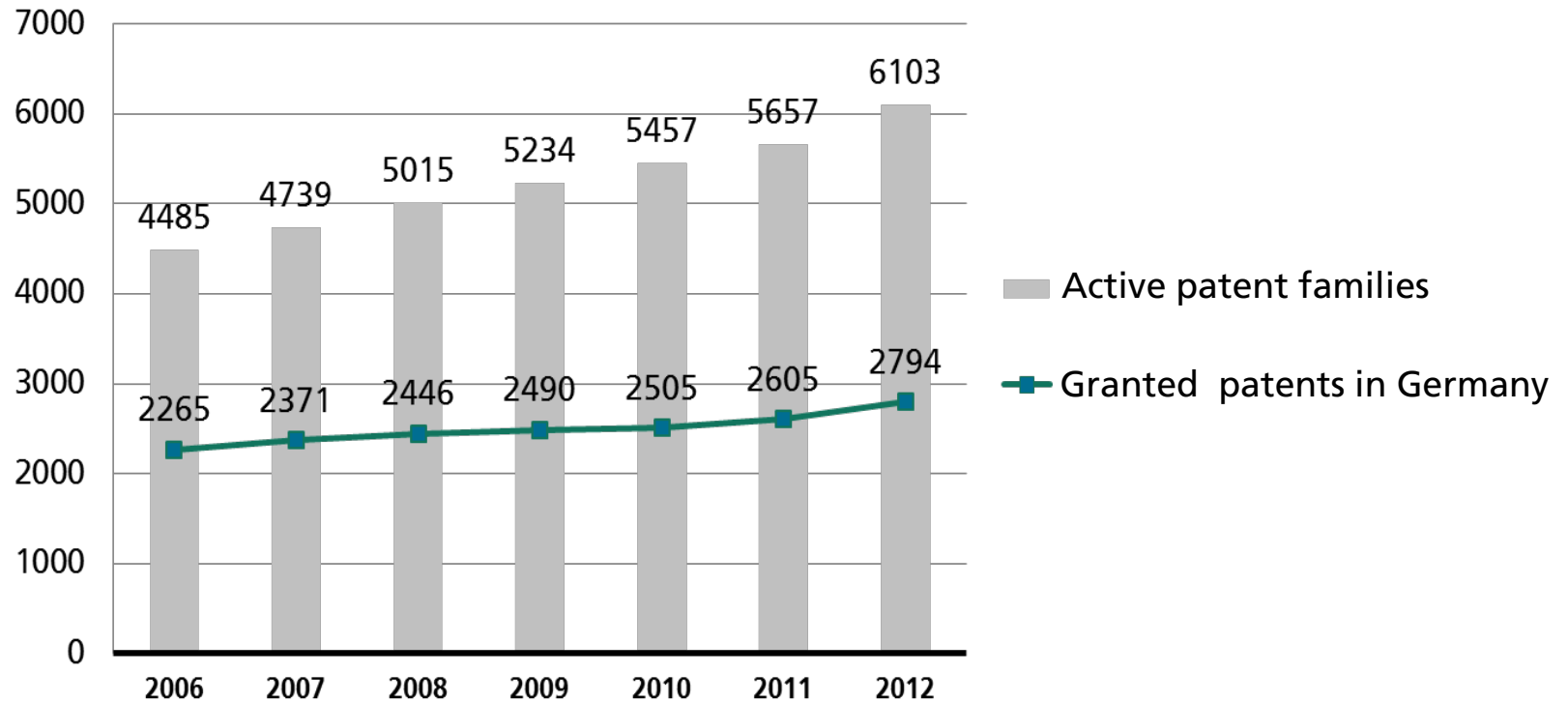


	Applicants	Seat	Applications
1	Robert Bosch GmbH	DE	3,972
2	Daimler AG	DE	1,991
3	Siemens AG	DE	1,921
4	Schaeffler Technologies AG & Co. KG	DE	1,854
5	GM Global Technology Operations LLC	US	1,565
6	Bayerische Motoren Werke AG	DE	829
7	Volkswagen AG	DE	805
8	Audi AG	DE	787
9	ZF Friedrichshafen AG	DE	740
10	BSH Bosch und Siemens Hausgeräte	DE	719
11	Hyundai Motor Company	KR	533
12	Ford Global Technologies LLC	US	504
13	Continental Automotive GmbH	DE	435
14	DENSO Corporation	JP	428
15	Fraunhofer-Gesellschaft e.V.	DE	424

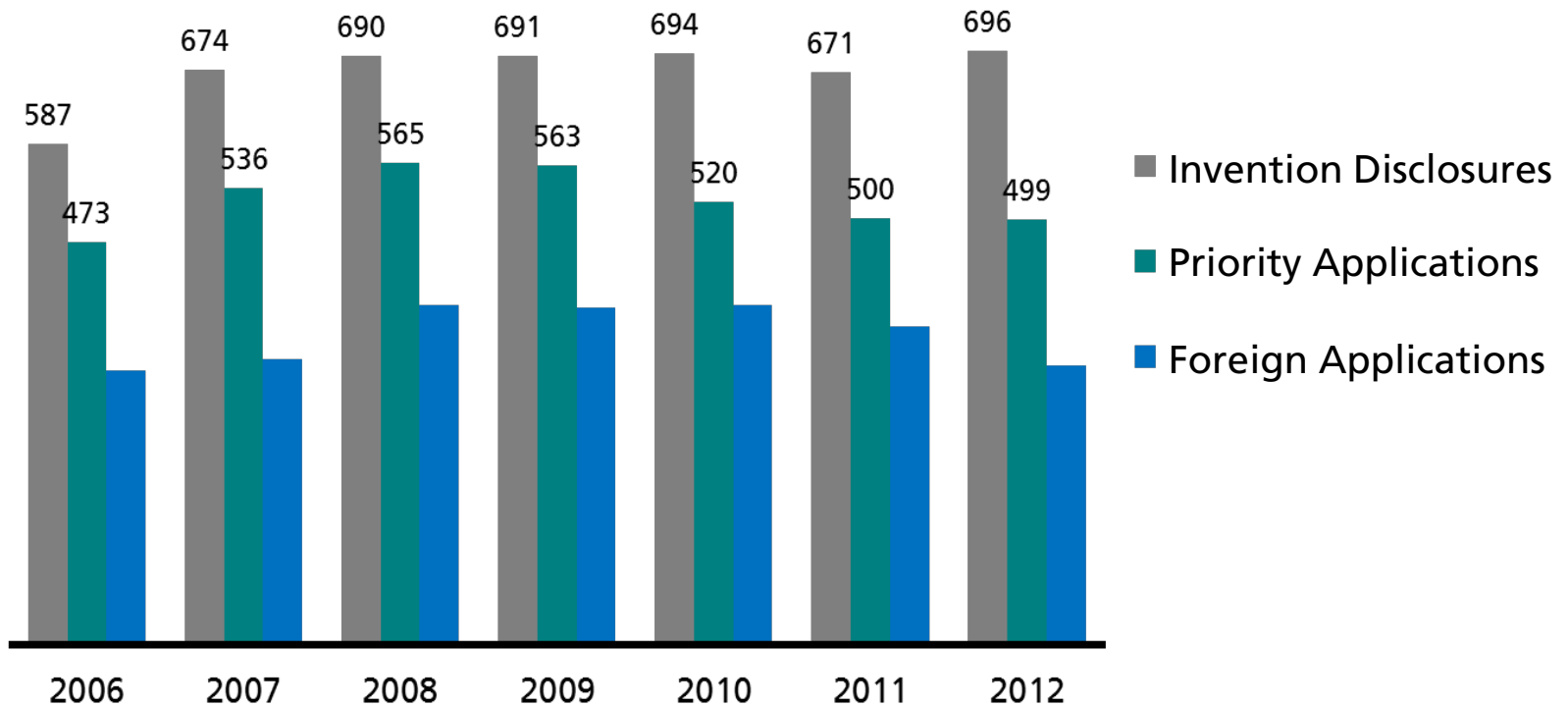
Quelle: Deutsches Patent- und Markenamt, Stand April 2013

\* Anzahl der im Jahr 2012 eingereichten Patentanmeldungen ohne Berücksichtigung evtl. Konzernverbundenheiten

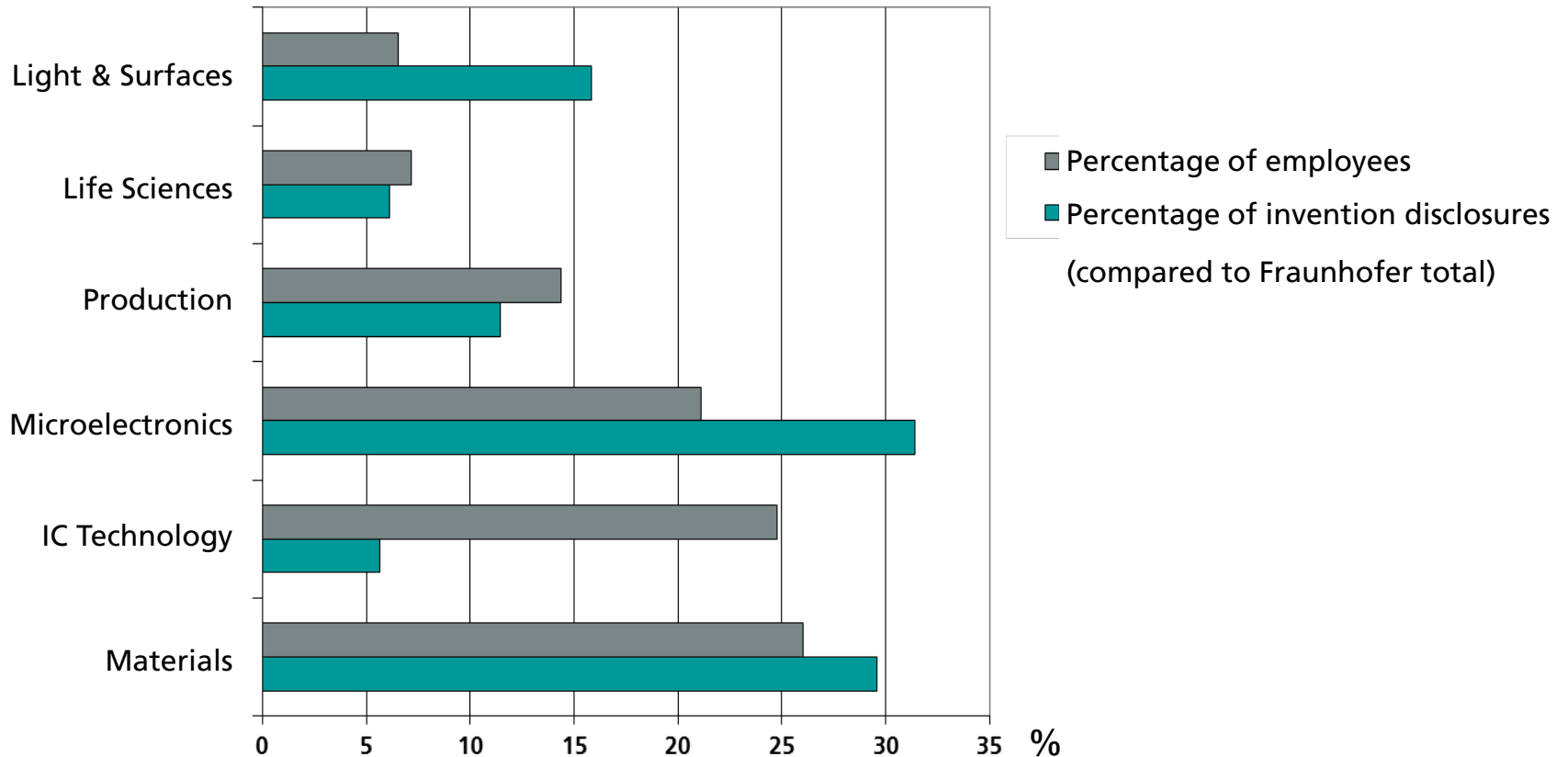
# Patent Families of Fraunhofer-Gesellschaft



# Invention Disclosures and Patent Applications of Fraunhofer-Gesellschaft



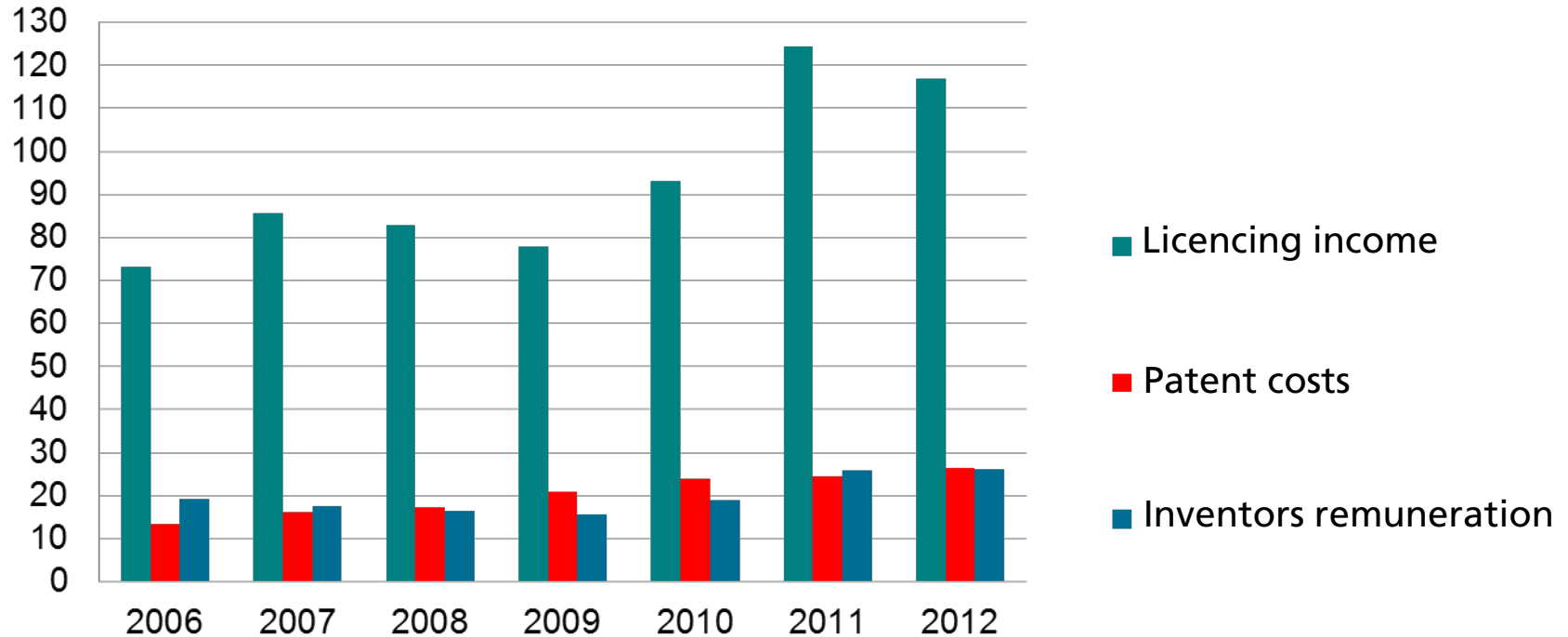
# Invention Disclosures of Fraunhofer Groups



Microelectronics and Materials are the most active Fraunhofer Groups in terms of invention disclosures

# Licencing Income, Costs and Inventors Remuneration of Fraunhofer Patents

Mio EURO

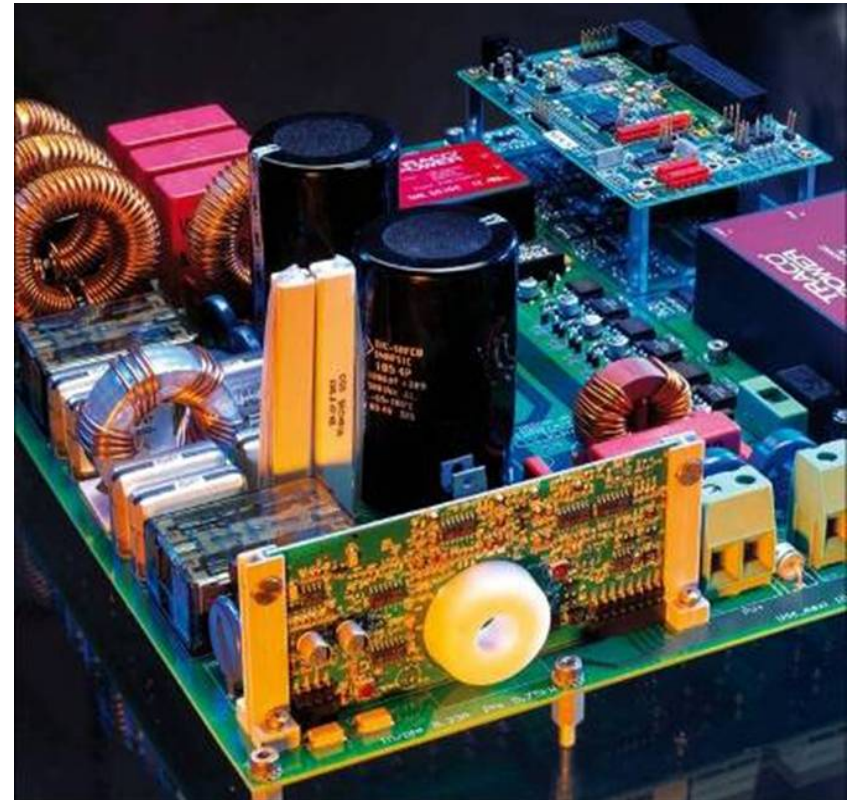


**Today Fraunhofer has an attractive income from stand-alone licensing!**



# A Practical Example - the HERIC PV-Inverter Topology

- New operating principle *and* topology for photovoltaic (PV) inverters invented in 2002
- Reduction of losses to one half (e.g. 4 % to < 2 %) by simple means
- Increase in efficiency from e.g. 96 % to > 98 %
- World record in efficiency with SiC-devices (> 99 %)
  
- Strong reduction of cooling efforts
- Reduced production costs
- Increased reliability



HERIC-Inverter circuit board with SiC devices

# A Practical Example - the HERIC PV-Inverter Topology

- Patent application in 2002
- **HERIC** trademarked:  
**H**ighly **E**fficient &  
**R**eliable **I**nverter **C**oncept
- Exclusive, time limited licence agreement already in 2002 (!)
- Market introduction in 2003
- US-patent in 2006
- Objections by third parties in EPA process
- EPA-patent granted in 2010
- Meanwhile > 5 license contracts



# Lessons learned (during patent application)

- The patent attorney **MUST FULLY UNDERSTAND** the invention!
- The patent attorney wants to make everybody happy....
- The outcome: **A** patent, but not necessarily a **GOOD** patent
- In most cases, this will never be detected!
- The inventor typically cannot judge the attorney's work!
- „It's time and money well spent to search for a good patent attorney!!!“

# Lessons learned (during marketing)

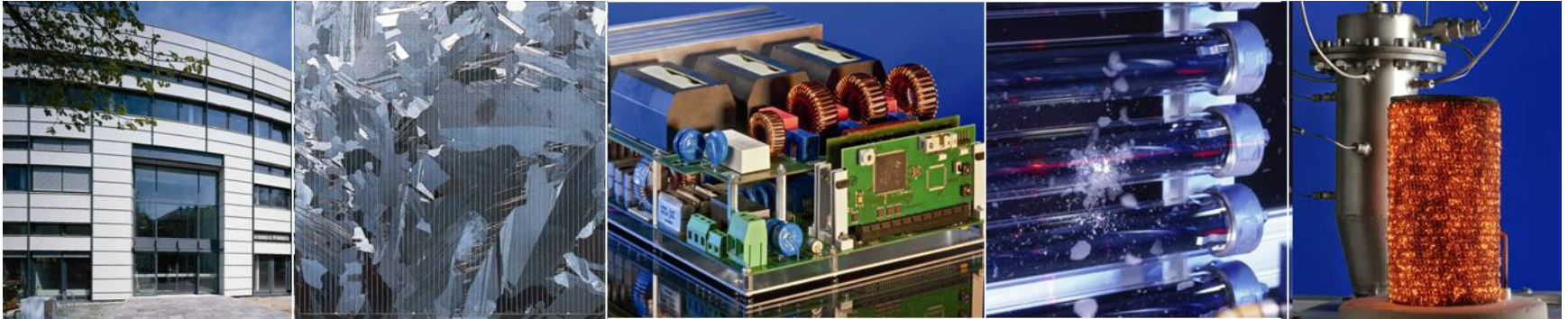
- Marketing of patents is a demanding full time job!
- Offering licences in the internet is not worthwhile
- Someone has to take care of the patent (in German: “Kümmerer”)
- From personal experience, the inventor is the best “Kümmerer”
- Fraunhofer offers good incentives: 30 % of the net licence income!

# Summary: HERIC- a Success Story!

- US patent granted in 2006
- EPA patent granted in 2010 with apparatus *and* method claims
- Exclusive licence converted into non exclusive licence contract
- Meanwhile > 5 licence contracts
- Joseph-von-Fraunhofer-Prize in 2011 for the invention, patenting and successful marketing of the HERIC-topology



# Thank you for your Attention!



Fraunhofer Institute for Solar Energy Systems ISE

Dr. Heribert Schmidt

[www.ise.fraunhofer.de](http://www.ise.fraunhofer.de)

[heribert.schmidt@ise.fraunhofer.de](mailto:heribert.schmidt@ise.fraunhofer.de)