



## **An ERC Grantee from China hosted in a German University**

Prof. Dr. Yong Lei

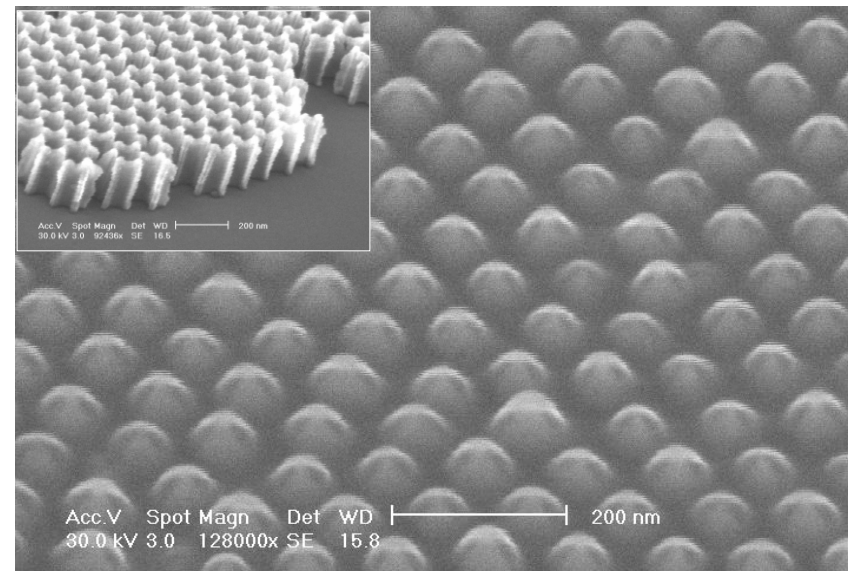
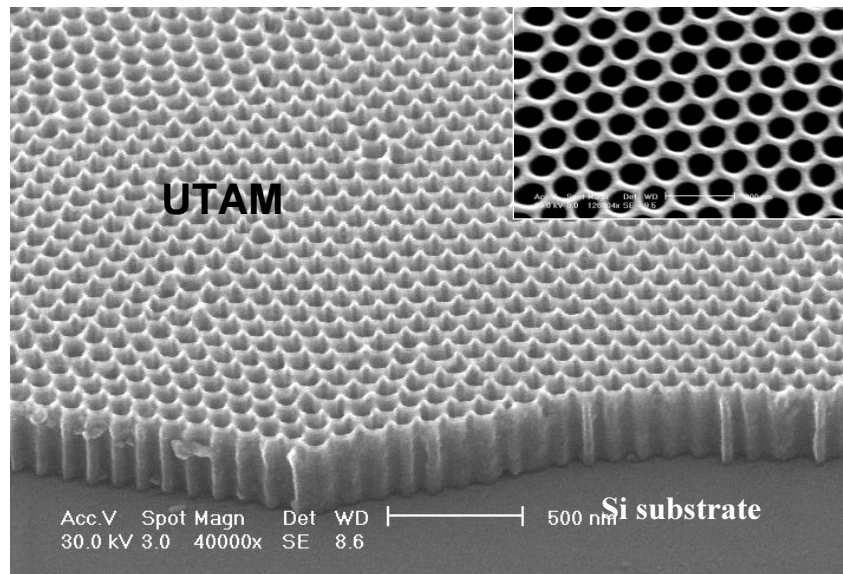
Institute of Materials Physics and Center for Nanotechnology  
University of Münster (WWU), Germany

## Content of this talk

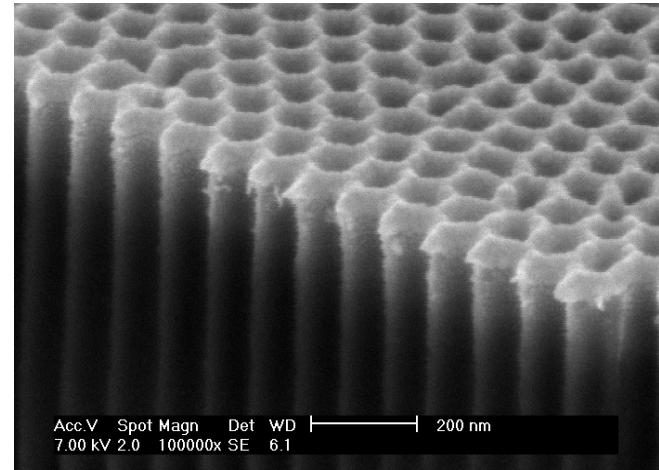
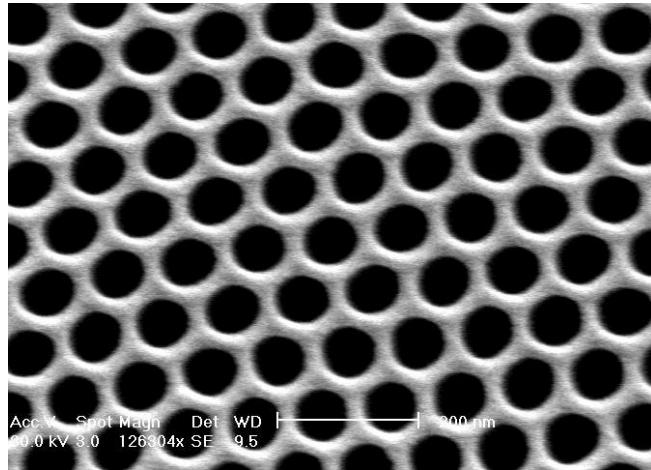
1. My research field and career  
(why did I apply for the ERC grant)
2. Experience of application and running of my ERC project

## My research fields:

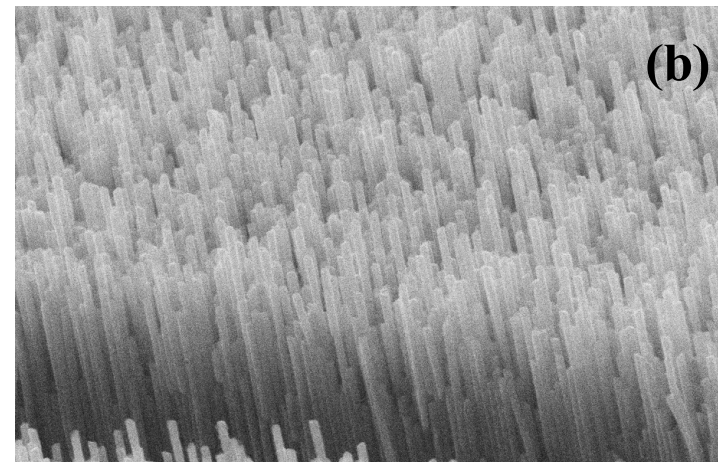
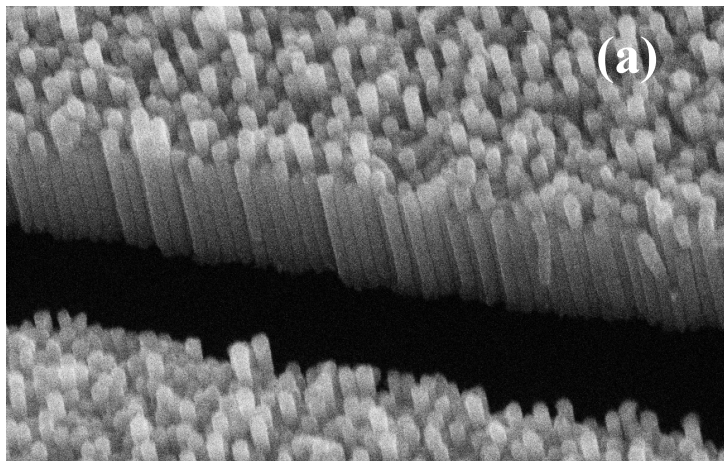
### surface nano-patterns and device applications



1996 – 2001: PhD study in Chinese Academy of Science (CAS):  
**Anodic Alumina Oxide (AAO) Nano-Porous Template**



**AAO nano-porous template (size controllable 10 – 400 nm & large area cm<sup>2</sup>)**



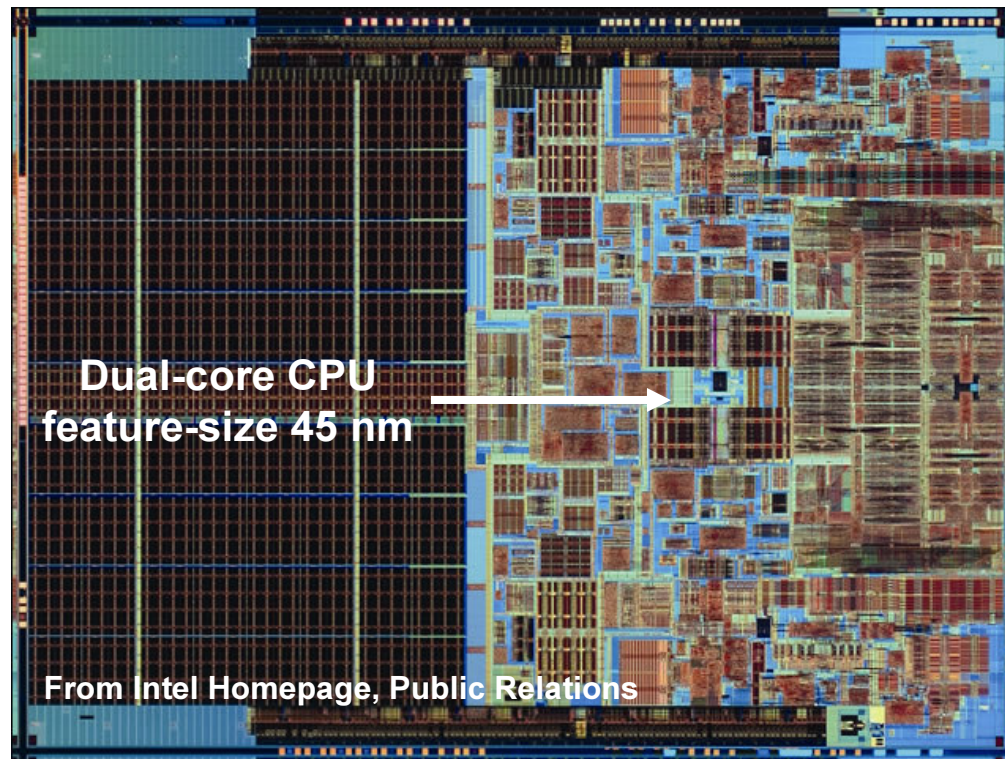
**Regular arrays nanowires after removing templates**

2001 - 2003

National University of Singapore (Singapore-MIT Alliance)

## Idea of the UTAM surface nano-patterning

- Surface nano-patterning - key to device miniaturization to nano-size level - large-scale ordered surface nanostructures.

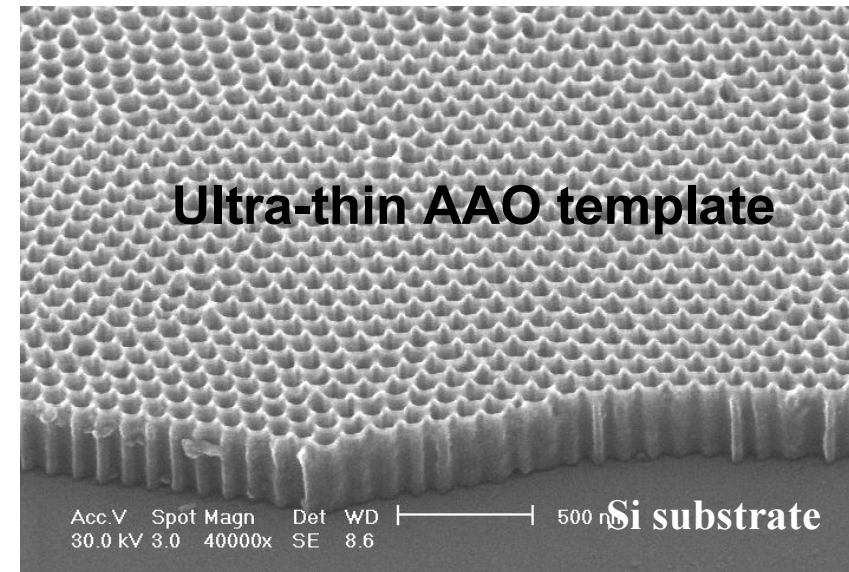
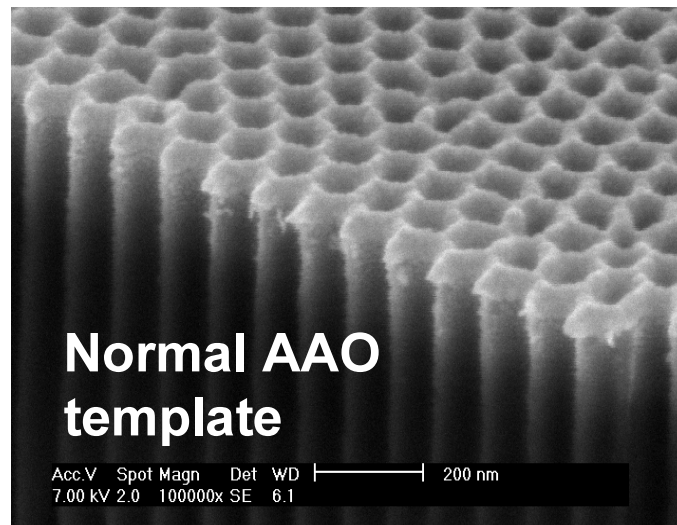


2001 - 2003

National University of Singapore (Singapore-MIT Alliance)

## Idea of the UTAM surface nano-patterning

- Surface nano-patterning - key to device miniaturization to nano-size level - large-scale ordered surface nanostructures.



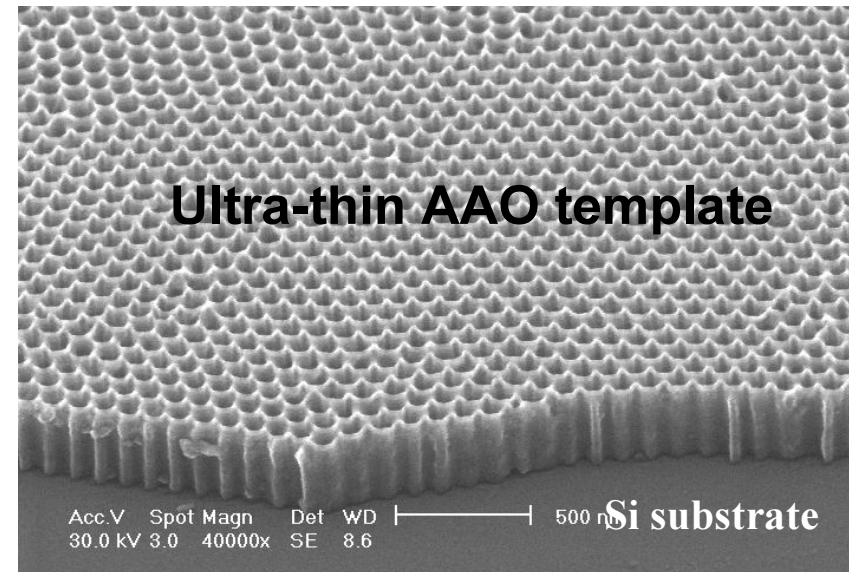
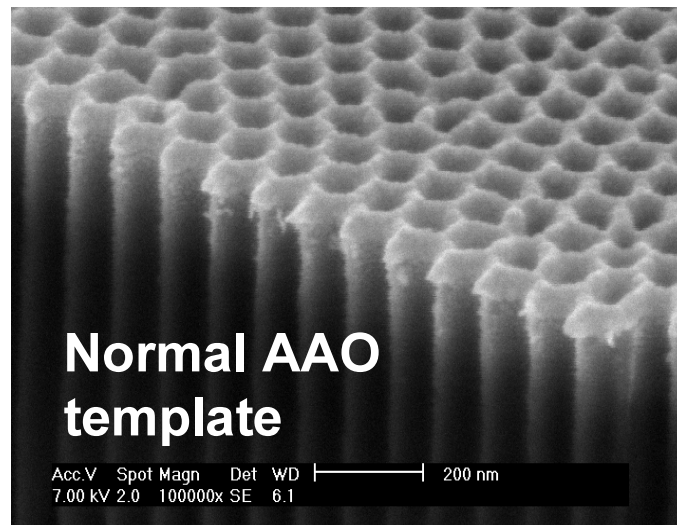
- An exciting idea and new concept:  
Transfer advantages of templates to surface nano-patterning -  
prepare an ultra-thin alumina membrane (UTAM) on a substrate

2001 - 2003

National University of Singapore (Singapore-MIT Alliance)

## Idea of the UTAM surface nano-patterning

- Surface nano-patterning - key to device miniaturization to nano-size level - large-scale ordered surface nanostructures.



The idea is attractive - high challenging (crazy): many technical points.

2003 – 2006

Institute of Nanotechnology (INT) in FZK at Karlsruhe, Germany

**Realize the idea of the UTAM surface nano-patterning**

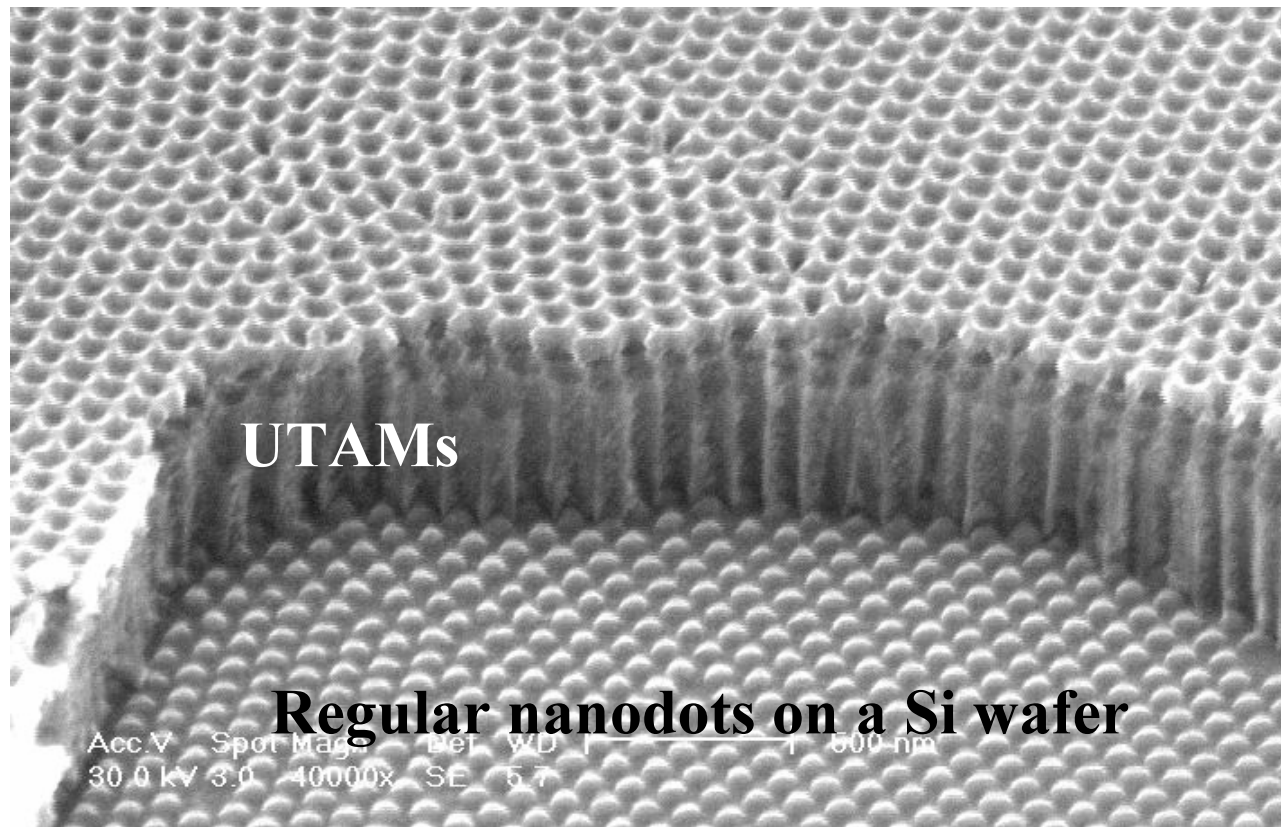
- 2004 solved all the technical points
- 2004 - 2006, published the results, gave a name ‘UTAM surface nano-patterning’ - received wide international scientific recognition
- Invited to publish a review (75 pages) in ‘Progress in Materials Science’ of UTAM nano-patterning technique
- I like to work on high-impact and risky ideas to challenge my imagination



2003 – 2006

Institute of Nanotechnology (INT) in FZK at Karlsruhe, Germany

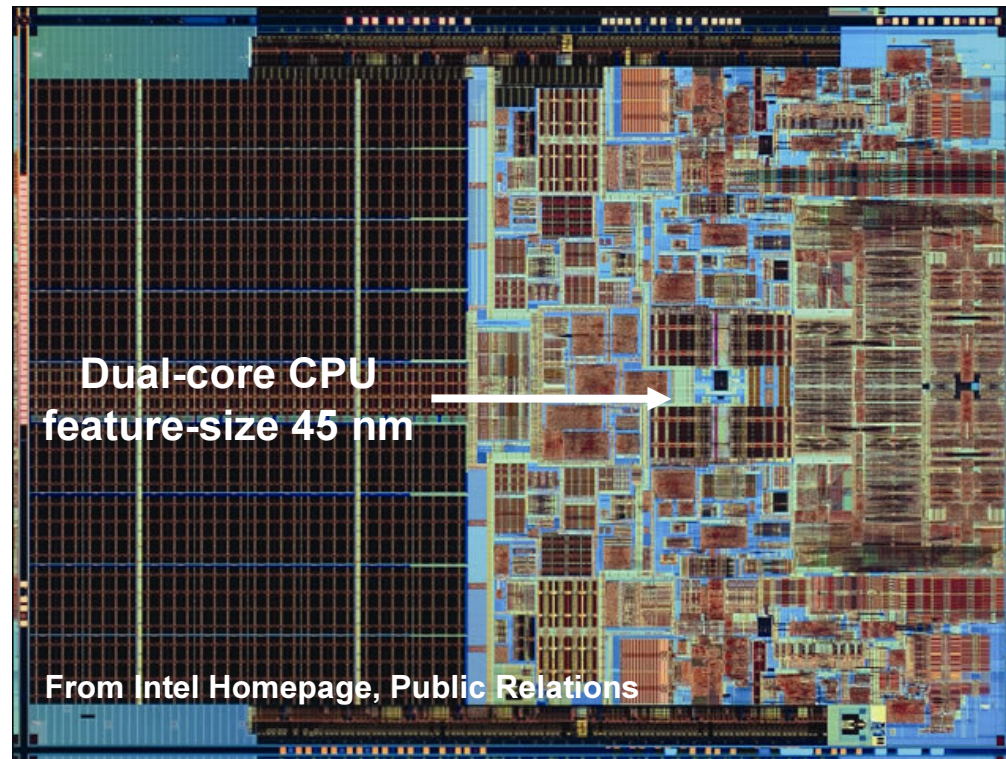
**Realize the idea of the UTAM surface nano-patterning**



2006: University of Muenster

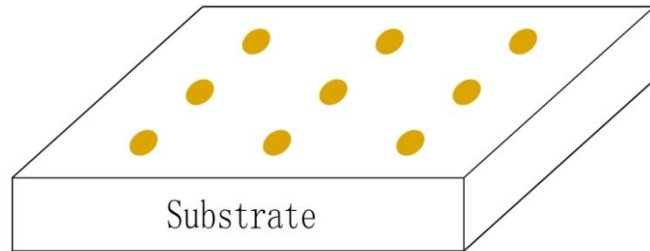
## Three-Dimensional Surface Nano-Patterning: Concepts, Challenges and Applications

(motivations to apply for ERC funding)



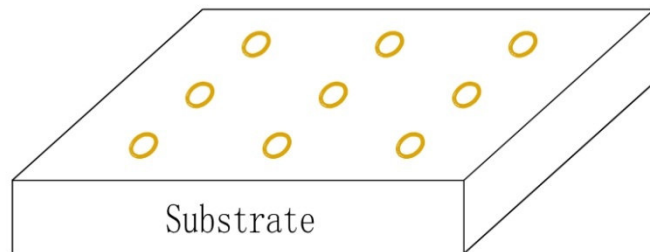
# Three-Dimensional Surface Nano-Patterning: Concepts, Challenges and Applications

## Multifunctional surface nano-structures



**nanodots**

One of the most attractive advantages of nano-materials (extremely large surface area) is missing in the existing 2-D surface nano-patterns



**nanorings**

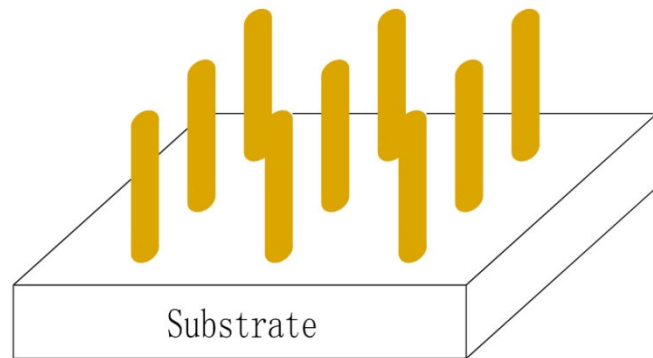
Only way to increase the device density is to decrease the pattern size

Large contacting influence from the substrate → very large signal noises → degrades device performance

**An efficient evolution from 2-D to 3-D surface nano-patterning:  
Change from nanodots or nanorings to nanowires or nanotubes**

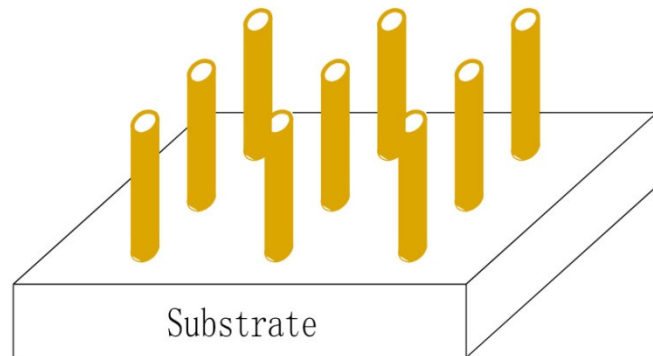
# Three-Dimensional Surface Nano-Patterning: Concepts, Challenges and Applications

## Multifunctional surface nano-structures



**nanowires**

One of the most attractive advantages of nano-materials (extremely large surface area) is missing in the existing 2-D surface nano-patterns



**nanotubes**

Only way to increase the device density is to decrease the pattern size

Large contacting influence from the substrate → very large signal noises → degrades device performance

**An efficient evolution from 2-D to 3-D surface nano-patterning:  
Change from nanodots or nanorings to nanowires or nanotubes**

A complicated new concept of surface nano-  
structuring

Where is the money?

ERC Starting Grant (2009)

## **My ERC Experiences (application process)**

- I was not asked by university to apply the ERC funding (WWU didn't have a recognized strategy to find out and support possible ERC candidate):
- Support during the application from WWU:  
Normal support: the hosting letter  
no other special support

## **My ERC Experiences (after received the funding)**

The react of university when I got the ERC funding:

1<sup>st</sup> ERC funding in WWU;

Support from the university:

Scientist (junior group leader) → W1 (Junior) Professor  
1 lab and 1 office for my group members

Some support to buy equipments

Other universities approach and ask me?

There is no achievement-oriented granting of funds related to ERC grant

## **My ERC Experiences (running)**

ERC funding (compare to German national funding):

- 1.ERC more focuses on high-impact (also high-challenging) topics and ideas;
- 2.The administrative steps of ERC is more flexible;
- 3.The ERC funding is much more competitive.



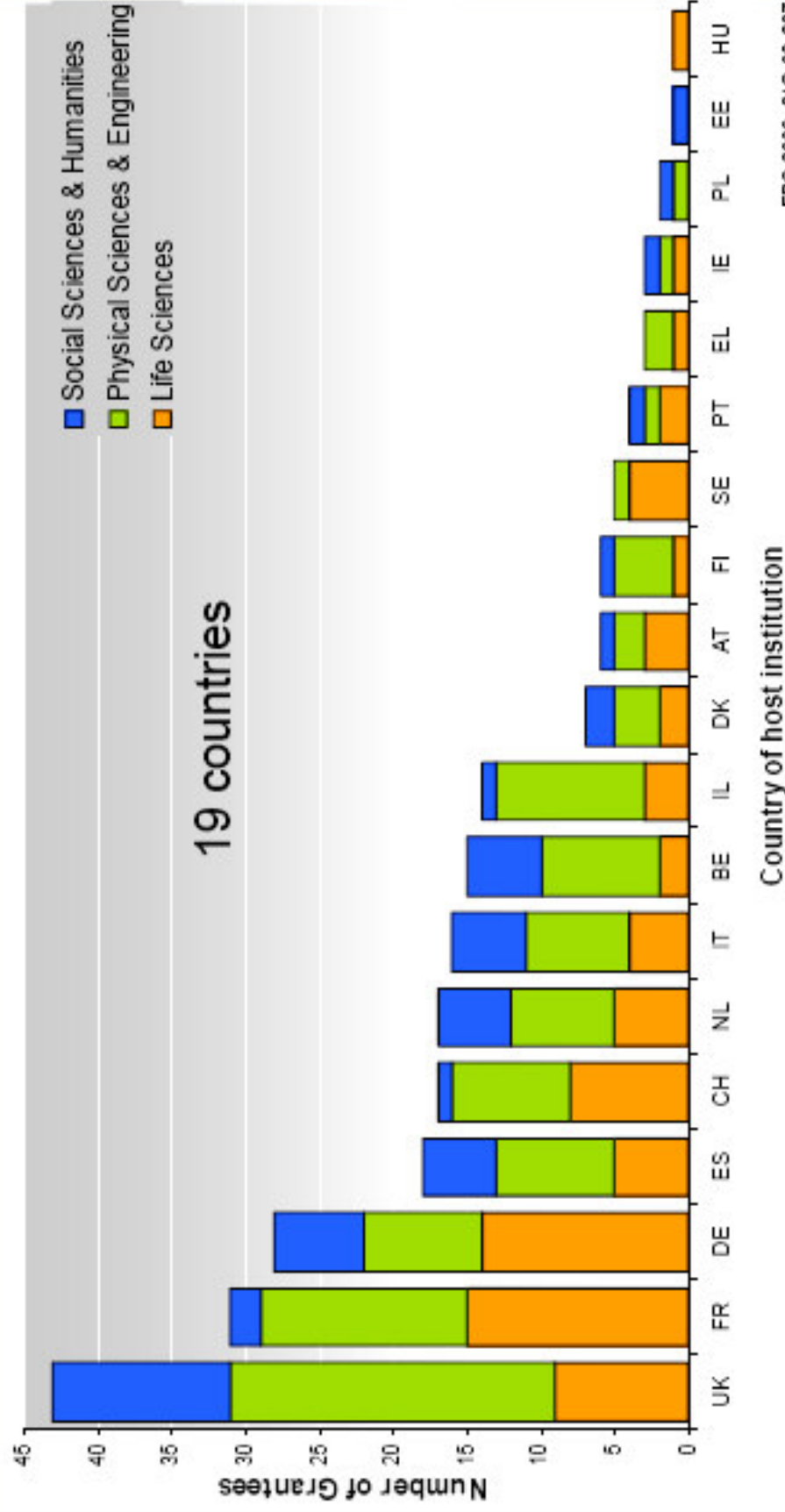
# The impact of the ERC funding to my scientific career (very important)

1. To realize the concept: 3D surface nano-patterning
2. Build an independent research group
3. Promotion in my scientific career  
Scientist → W1 professor (2009)  
(receive a call recently as a W2 professor in TU  
Ilmenau)

# ERC Starting Grant: 2009 call

## Grantees by country of host institution & domain

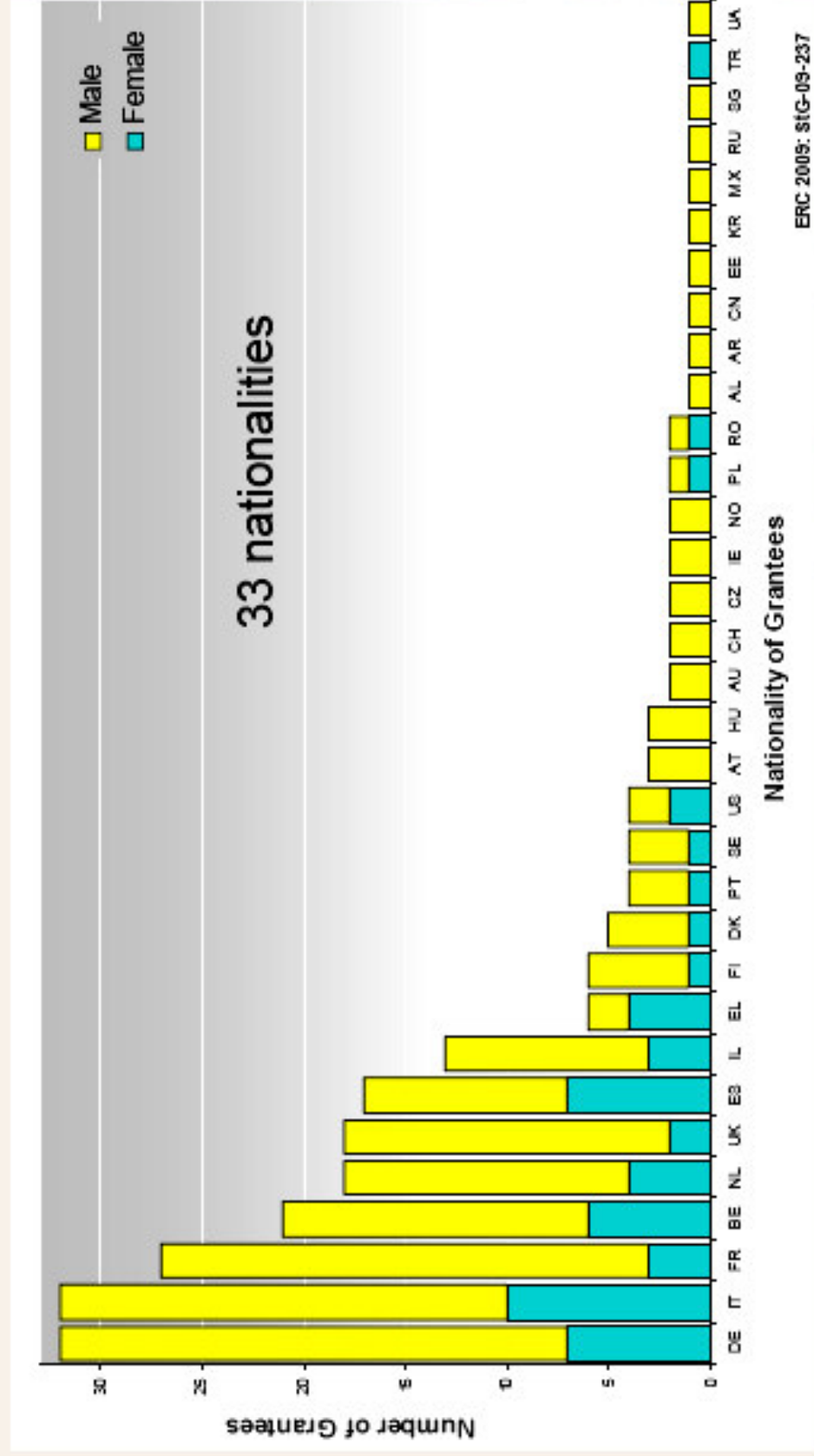
Source: top 237 proposals



# ERC Starting Grant: 2009 call Grantees by nationality & gender

Source: top 237 proposals

European Research Council



Nationality of Grantees

ERC 2009: StG-09-237



From the point of view of an ERC starting grant awardee:

The main motivation of the ERC starting grant:

Excellent scientist → Independent group leader

Or to consolidate the independence of a group leader

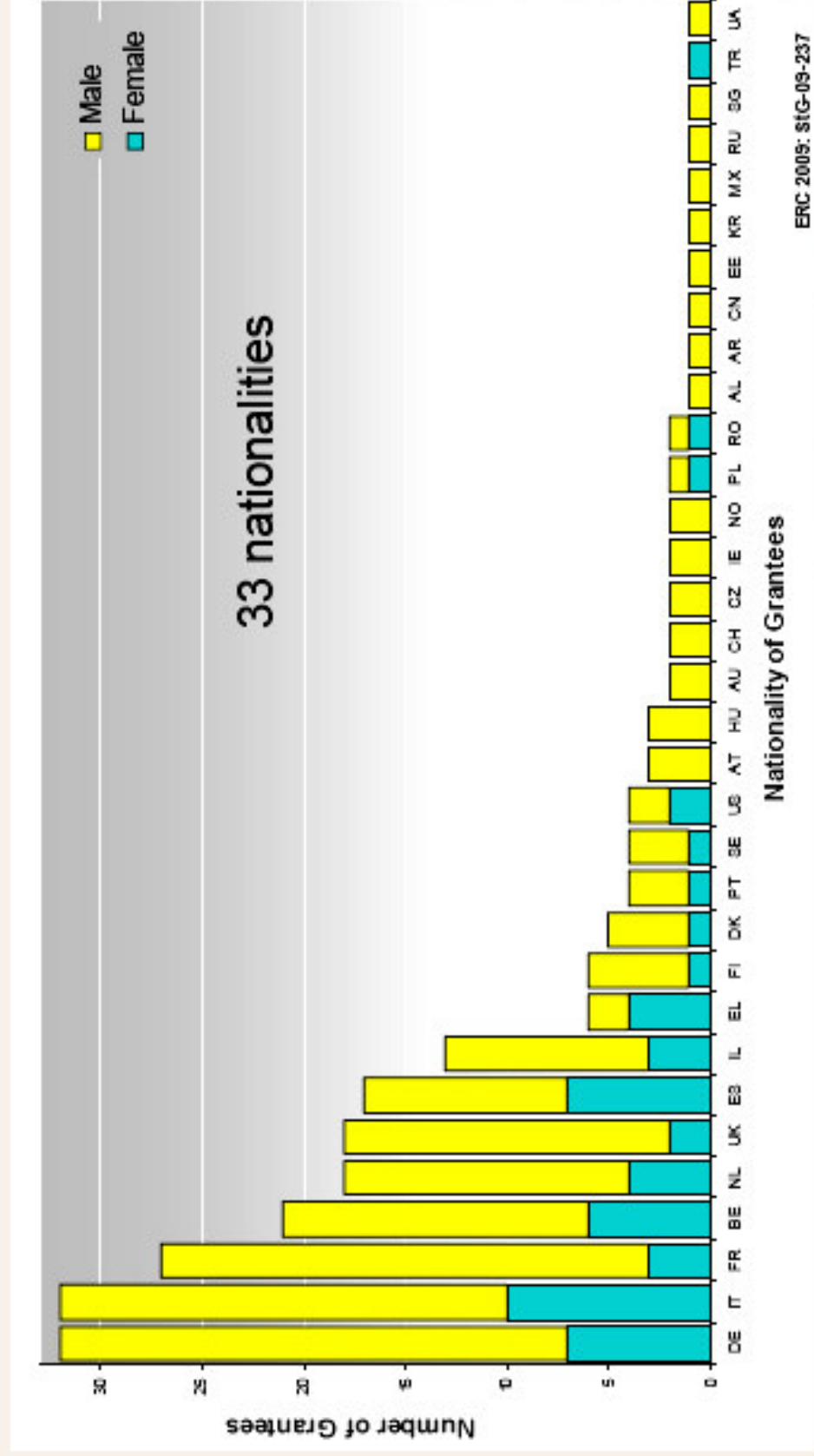
In the future, to become a professor

1. Host university could provide long-term chances for ERC awardees (e.g., tenure–track professor positions).
2. Complete independence (enough lab and office space for the ERC group).

# ERC Starting Grant: 2009 call Grantees by nationality & gender

Source: top 237 proposals

European Research Council



Nationality of Grantees

ERC 2009: StG-09-237



# *Acknowledgement to ERC*

Surface Nano-Structuring Group

Leader: Prof. Yong Lei

Behnaz Arvan

Stefan Bartels

Dr. Hongjun Chen

Yaoguo Fang

Fabian Grote

Christian Heckel

Peter Heß

Yan Mi

Stefan Ostendorp

Dr. Hui Sun

Dr. Zhenyang Wang

Liaoyong Wen

Nina Winkler

Dr. Kin Mun Wong

Dr. Zhibin Zhan

Dr. Huaping Zhao

Ranjith Vellacheri

**Thank you for your  
attention!**