An ERC Grantee from China hosted in a German University

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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

AAO nano-porous template (size controllable 10 – 400 nm & large area cm²)

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

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

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**

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

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

Large contacting influence from the substrate $\rightarrow$ very large signal noises $\rightarrow$ 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:
1st 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 $\rightarrow$ 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

19 countries

Country of host institution:
- UK
- FR
- DE
- ES
- CH
- NL
- IT
- BE
- IL
- DK
- AT
- FI
- SE
- PT
- EL
- IE
- PL
- EE
- HU
ERC Starting Grant: 2009 call
Grantees by nationality & gender
Source: top 237 proposals

33 nationalities

Number of Grantees

Nationality of Grantees

Male
Female

OE IT FR BE NL UK ES IL EL DK PT SE US AT HU AU CH CZ IE NO PL RO AL AR CN EE KR MX RU SG TR UA
From the point of view of an ERC starting grant awardee:

The main motivation of the ERC starting grant:
Excellent scientist $\rightarrow$ 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

33 nationalities
Acknowledgement to ERC

Surface Nano-Structuring Group
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Ranjith Vellacheri
Thank you for your attention!