



At 2014 IUPAC World Polymer Congress (MACRO 2014)
July 6- 11, Chiang Mai, Thailand

Graduate Education in Institute of Chemistry, Chinese Academy of Sciences

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Dr. Weiming Ma

2002 Course study, Graduate School CAS

2003 Started research on

Crystallization of polymers in $scCO_2$

- Accumulating phenomena
- Exploring trend
- Revealing mechanism

2004 - *Macromolecules*

2005 - *Macromol. Rapid Commun.*

- *Polymer*

- *Macromolecules*

2006 - *Polymer Bulletin (a review in Chinese)*

2007 - *Polym. Intern.*

- *Polymer*

- *J. Polym. Sci. Part B: Polym. Phys.*

2008 - *Macromolecules*

2007 Received Ph. D. degree

2007 Dow Chemical (China) Company Limited, Shanghai,

Graduate education

Full procedure

- **Course study**
 - 1st year in Graduate School, CAS (University of CAS)
- **Experimental (or theoretical) research**
 - 2nd- 5th year in Institute of Chemistry, CAS
 - Topics mainly extracted from different projects of budget sources: domestic or international
- **Dissertation and defense**

I. Course study

Credits requested: 37
Philosophy 3
English 3 for MS 3 for Ph D 2

Chemistry

Course	Class time/h	Credit
Polymer Chemistry	40	2
Advanced Organic Synthesis	40	2
Organic Structure Analysis	40	2
Advanced Physical Chemistry I	40	2
Advanced Physical Chemistry II	20	1
Polymer Physics	40	2

Polymer Chemistry and Physics

- Basic courses

Course	Class time/h	Credit
Topics in Polymer Physics	40	2
Topics in Polymer Chemistry	40	2
Functional Polymers	40	2
Soft Matter	40	2
Polymer Processing	40	2
Polymer Blends and Composites	40	2
Analytic Techniques for Polymer	40	2
Theoretical Simulation and Application	40	2
Advanced Functional Polymers	40	2
Chemistry of Membranes	40	2
Principle and Application of EPR Spectrometry	40	2

- Specialty courses

Course	Class time/h	Credit
Polymer Photochemistry	40	2
Natural Polymers	30	1.5
Structural Analysis of Crystals	40	2
Spectroscopic Analysis of Organic Compounds	40	2

- Experiments

Course	Class time/h	Credit
Polymer Synthesis and Molding	40	1
Advanced Synthesis and Separation in Organic and Polymer Chemistry	70	2
Chromatography and Spectrometry	24	0.5
Analysis of Structure and Properties	20	0.5

II. Experimental (or theoretical) research

in laboratories of ICCAS

- **Instrument operation training**
 - **NMR, TEM, SEM, STM, AFM and other spectroscopy measurements**
 - **Certification**
- **Topics extracted from different projects**

Budget sources: domestic or international

 - **National Natural Science Foundation**
 - **Ministry of Science and Technology**
 - **Contract research**
 - **Post-doc research**



Institute of Chemistry, Chinese Academy of Sciences (ICCAS)

Basic research
High-tech research R & D
Technology transfer

- Multidisciplinary

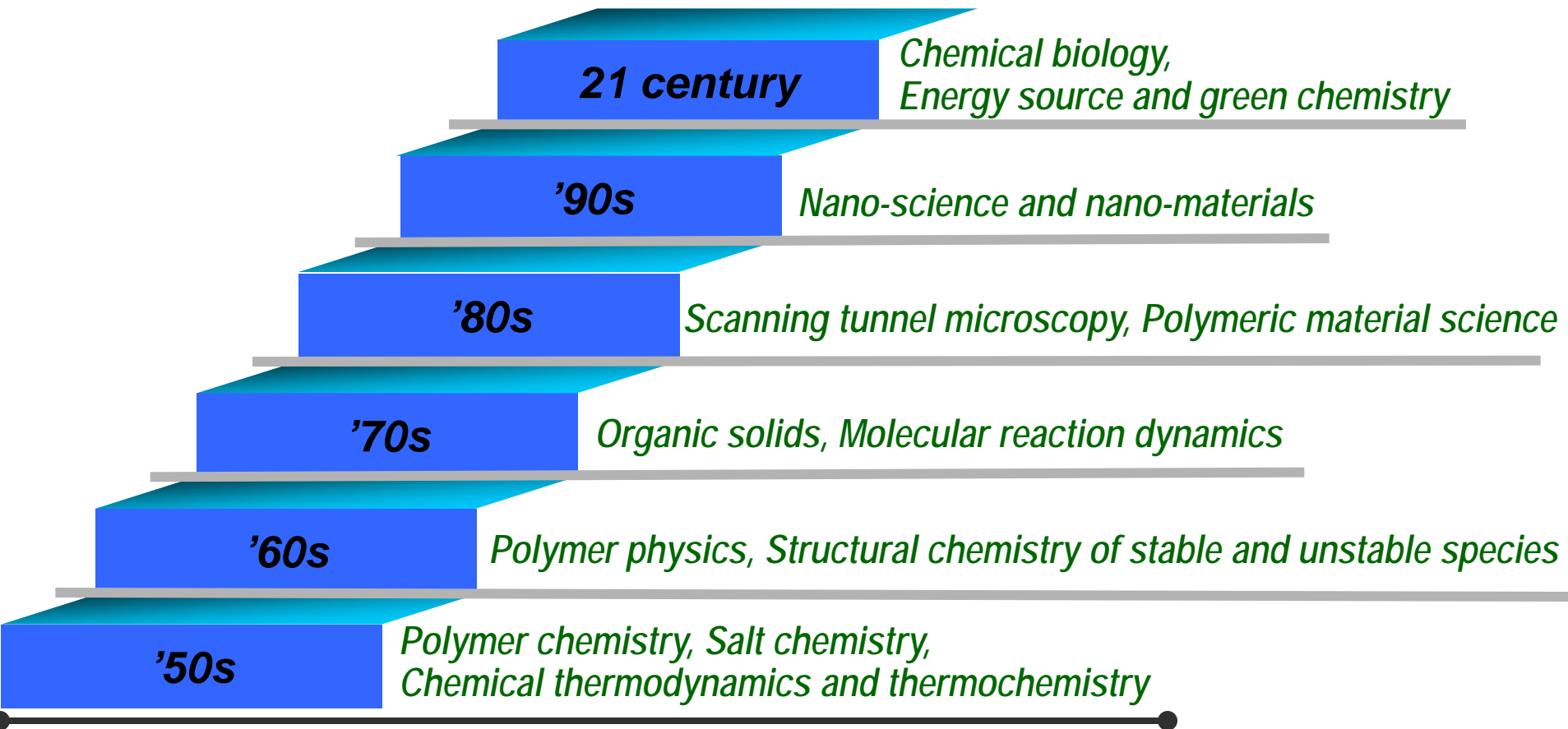
- interdisciplinary

- comprehensive:

- Physical chemistry
- Inorganic chemistry
- Organic chemistry
- Polymer chemistry and physics
- Analytical chemistry

ICCAS

at the frontier of chemistry research in China



Staff 627
Professors and technicians 496

Full professor 101

Associate professor 229

Research associate and technician 166

Pursuing degrees 961

• ~ 200 (for MS , PhD) per year

Per supervisor only $(961/330) = 2.9$

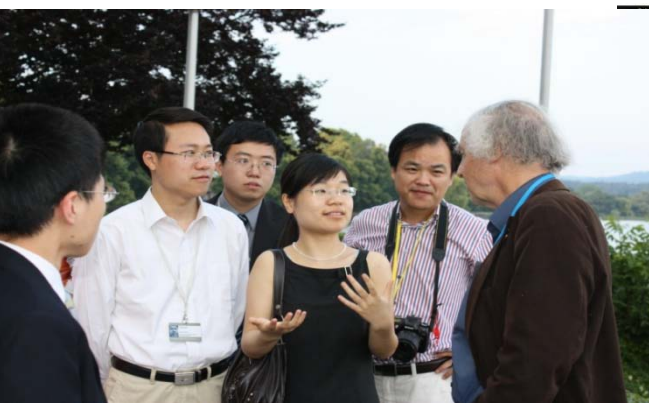
Section Polymer Science and Materials

- ❖ **State Key Laboratory of Polymer Physics and Chemistry**
(Jointed with Changchun Institute of Applied Chemistry)
Fundamental research, structure-properties relationship, and instruments
- ❖ **CAS Key Laboratory of Engineering Plastics**
Applied research and technology development
- ❖ **Laboratory of Advanced Polymeric Materials**
Synthesis and applications of high-performance polymers for aviation and aerospace, and meet national needs

- **Polymer Chemistry**
 - New catalysts and monomers
 - Polymerization method
 - Chain structure and architecture control
- **Polymer Physics**
 - Polymer solution
 - Polymer melt
 - Simulation
 - Structure characterization
- **Polymer Materials and Composites**
 - Polymer processing
 - Micro-processing of hybrid polymers
 - Processing of high-performance polymers

International academic exchanges

- Short term exchanging study abroad
 - China-Europe joint program
 - BASF summer camp
- Asian Core Winter School
- International forums, conferences and workshop





III. Dissertation and defense

- **Dissertation written under a coherent title with chapters (all research results):**
 - Abstract
 - Introduction
 - Chapter on materials and experimentals
 - Chapters on results
 - Summary and conclusions
- **Published results organized well into respective chapters logically**



IV. Mutual benefits

- From 1978 to 2012

Enrolled graduate students 5016

Graduated 4680

Degree authorized

Ph D 2635 MS 2045

Graduated in 2013 201

Graduated in 2014 223

Jobs after graduation

Year	2001	2002	2003	2004	2005	2006	2007	2008
Graduated	92	89	122	99	115	133	165	186
Employed	92	89	122	99	115	133	158	186

After graduation

Pursue for Ph. D.	9	11	16	0	0	0	0	0
Postdoctoral	0	2	3	14	10	8	14	10
Going abroad	60	52	77	41	54	61	53	70
ICCAS	8	13	5	11	12	17	17	18
Other research institutes	2	7	8	13	10	13	25	34
Companies (incl. international)	9	3	8	5	7	14	19	30
University	4	1	5	15	22	20	30	24

Rate 100% 100% 100% 100% 100% 100% 96% 100%

Year	2009	2010	2011	2012	2013	Total
Graduated	188	195	184	208	201	976
Employed	188	195	184	208	192	968
After graduation						
Postdoctoral (abroad)	53	38	38	36	38	203
Postdoctoral (domestic)	17	15	11	18	25	86
Research institutes (include. ICCAS)	44	50	49	49	50	239
Companies (include. International)	48	58	48	62	44	259
University	20	27	26	25	31	129
Others	6	7	12	18	4	51
Rate, %	100	100	100	100	96	

Employment rate:

first year after graduation 93%- 95%

second year ~100%

Section Polymer Science and Materials

Year	SCI Publications			Patents	
	Total	IF < 3	IF > 3	Applied	Authorized
2008	181	97	84	42	18
2009	151	79	72	44	18
2010	175	71	104	42	34
2011	186	79	107	56	26
2012	195	59	136	53	26
2013	149	34	115	34	12
Total	1037	419	618	271	134



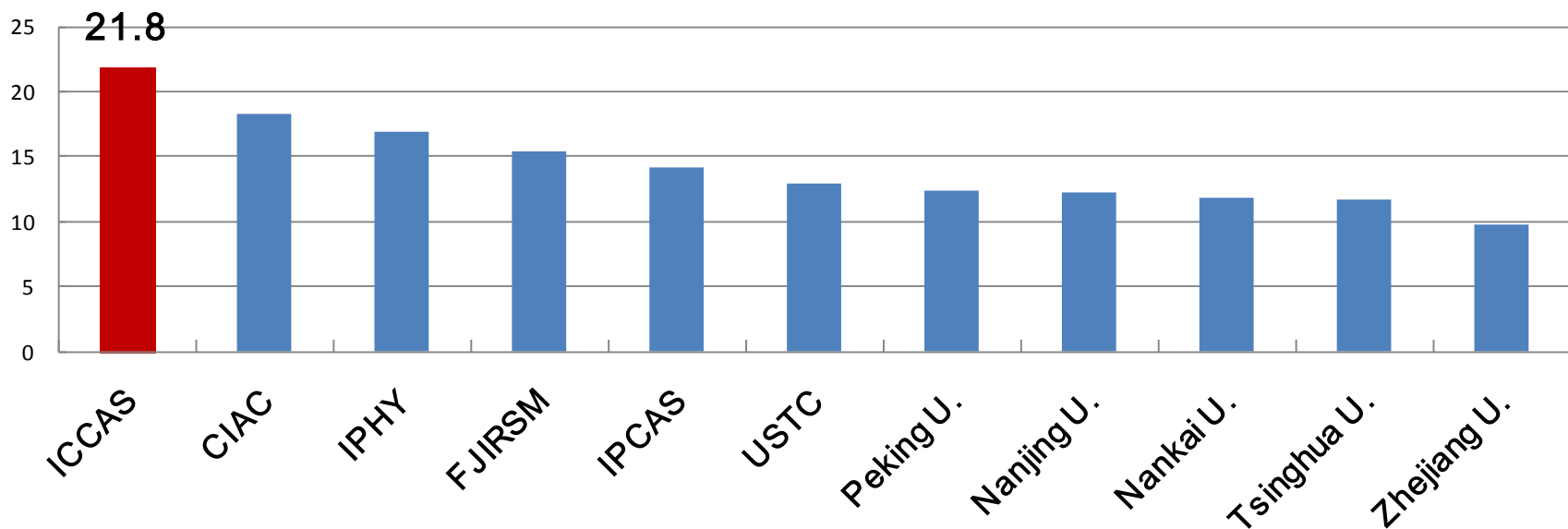
Publication of ICCAS

Year	SCI articles	Rank*	SCI cited papers	Rank*
2006	619	1 st	1367	1 st
2007	650	1 st	1493	1 st
2008	648	1 st	1670	1 st
2009	641	1 st	1002	1 st
2010	651	1 st	1868	1 st
2011	734	1 st	2076	1 st
2012	725	2 nd	2402	1 st

* Rank among research institutions in China

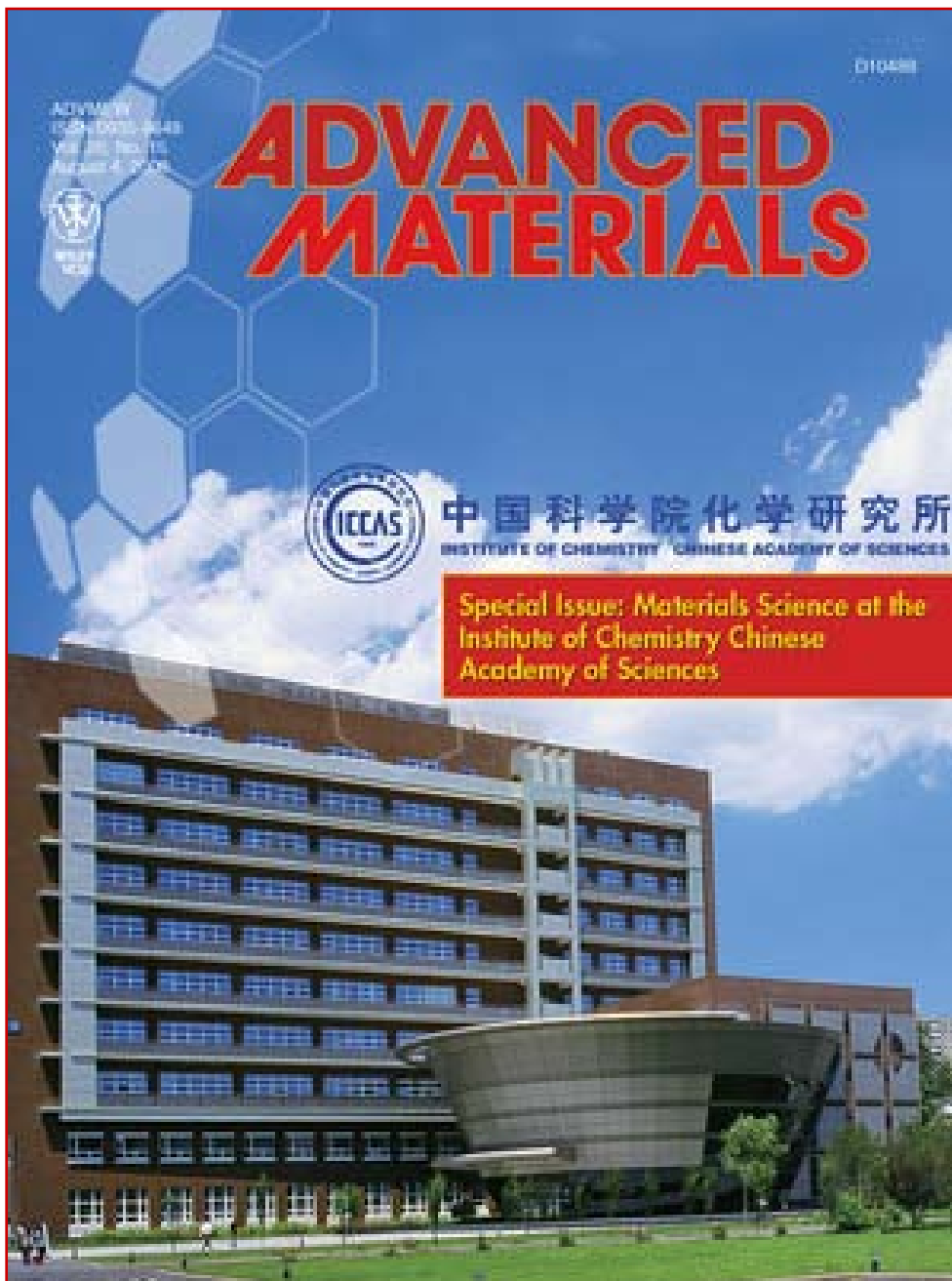
Average Citations per SCI Paper during 2002-2012

(Data from Institute of Information of MOST, China)



Top Ten Average Paper Citation Countries during 2002-2012

US	19.59
Germany	14.82
France	13.51
Japan	12.47
China	8.06

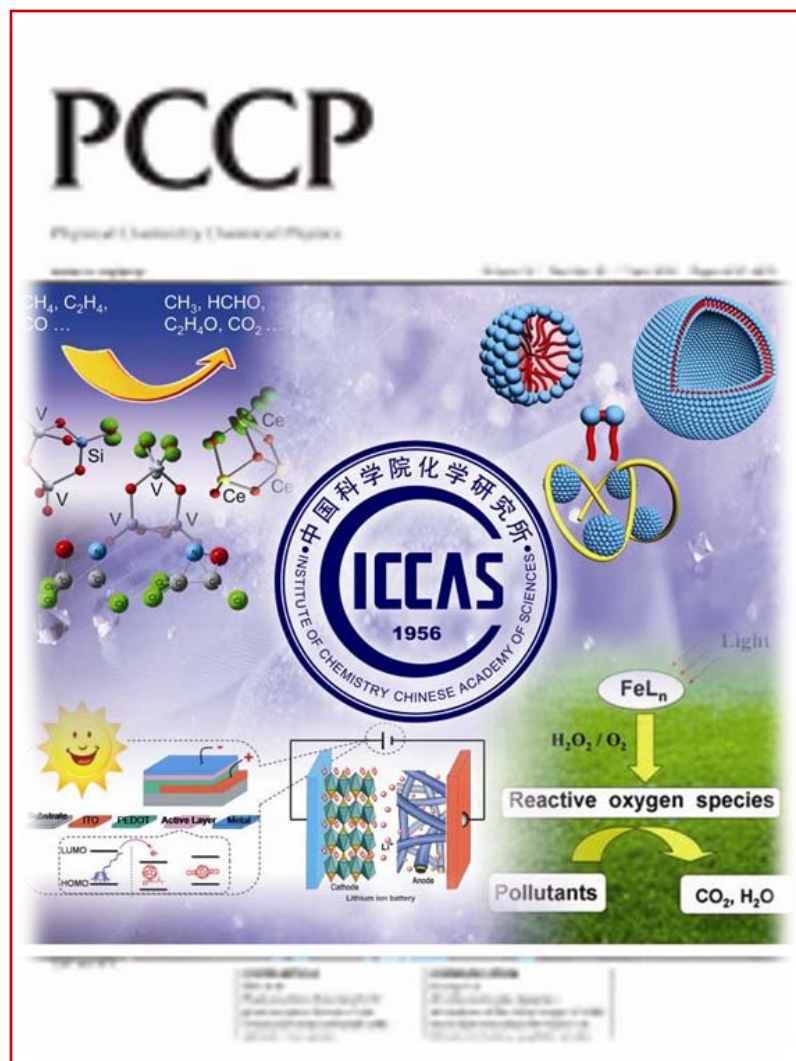


ADVANCED MATERIALS

Volume 20 Issue 15, 2008
ICCAS Special Issue

- Reporting research results obtained in ICCAS
- First time to publish a special issue for a research institute in the world

Physical Chemistry Chemical Physics Issue 6, 2011



《中国科学：化学》 SCIENTIA SINICA August 2011



CAS-TWAS President's Fellowship Programme for PhD Candidates from Developing Countries

To pursue PhD degrees at

- University of Chinese Academy of Sciences (UCAS)**
- University of Science and Technology of China (USTC)**
- Institutes of CAS around China**

Funding duration is 4 years, divided into:

- Maximum 1 year study of courses and participation in centralized training at UCAS/USTC, including 4 months compulsory courses in Chinese Language and Culture**
- Practical research and completion of degree thesis at colleges and schools of UCAS/USTC or CAS institutes**

Fellowship awardees will receive

- **Travel from their home countries to China in order to begin the fellowship in China (one trip only per student/scholar)**
- **Visa fee be covered (once only per student/ scholar)**
- **A monthly stipend
of RMB 7,000 or RMB 8,000
(including accommodation and other living expenses, local travel expenses and health insurance)
from CAS through UCAS/USTC
Depending on whether he/she has passed the qualification test arranged by UCAS/USTC for all PhD candidates after admission.**
- **All awardees be provided tuition waivers**

Applicants must

- **Maximum age of 35 years on 31 December 2014**
- **Not take up other assignments during the period of his/her fellowship**
- **Be a citizen of a developing country other than China**
- **Not hold any visa for temporary or permanent residency in China or in any developed country**
- **Be financially responsible for any accompanying family member**

Applicants for PhD study should also:

- **Meet the admission criteria for international students of UCAS/USTC**
- **Hold a master degree before the beginning of the fall semester: September, 2014**
- **Provide evidence that he/she will return to their home country on completion of their studies in China according to CAS-TWAS agreement**
- **Provide proof of knowledge of English or Chinese language**

Thank you for your attention!

Your comments are welcome!







Sources of research budgets

National Natural Science Foundation

- General Program
- Key Program
- Major Program
- Major Research Plan
- National Science Fund for Distinguished Young Scholars
- Young Scientists Fund
- Science Fund for Creative Research Groups

- Joint Research Fund for Overseas Chinese Scholars and Scholars in Hong Kong and Macao
- National Science Fund for Talent Training in Basic Science
- International (Regional) Cooperation and Exchange
- Programs of Joint Funds
- Special Funds

Ministry of Science and Technology

- National High-tech R&D Program (863 Program)
- National Key Technologies R&D Program
- National Basic Research Program of China (973 Program)
- National Science and Technology Infrastructure Program
- Environment Building for S&T Industries
- Mega-projects of Science Research for the 10th Five-year Plan