Yang JING, Ph. D

873 Clopper Rd, Apt.B3
Gaithersburg, MD 20878, USA

Cell Phone: (240) 478-0587
Home Phone: (301) 685-1545
E-Mail: jingyang129@hotmail.com

Immigration status:
H1B visa; Green Card in petition (Outstanding Researcher), Holding Employment Authorization

---

GOAL

Research position in academic or industrial institutions in the areas of MEMS, sensors, actuators and system, design and simulation, nanofabrication, surface & coating technology; tribology and surface engineering, and other related fields.

SUMMARY OF QUALIFICATIONS

Six years of research experience in semi-conducting process technology, including photolithography, thin film techniques, and usage of SEM, AFM, XPS, XRD, Silicon-RIE, and CNC machining.

* One aspect of my research focuses on micro-nano electronics IC processing & equipments, and piezoelectric technology. Five years industry experiences in the fields of design, fabrication and characterization a micro-actuator device based on resonating nano-sized cantilevers. **Especially, nano-scale RIE technology has been introduced for eliminating of silicon substrate.** The micro-actuating principle is based on measuring resonant frequency shifts of the nano-sized cantilever due to nano-scale bonding of the Ti/SiO_2/Si and SiO_2/PZT/Pt/Ti nano-multilayer piezoelectric micro-actuator applying for hard disk drives (HDDs). This patent has been designed to function both in hard disk drives and dual-stage servo system in computer. The main challenge of the project has been to integrate the piezoelectric micrometer sized actuators with standard CMOS technology. Since 2006, he is also a member of International Frequency Sensor Association (IFSA).
* The other aspect of Dr.JING's research interests is in tribology and surface engineering. His research projects include multi-scale analyses of micro-nanotribology problems, advanced theories of and methods for contact and interfacial mechanics, elasto-hydrodynamic lubrication, industrial applications of novel surface textures concept, low-friction interface design, and contact failure prevention. His research is funded by federal agencies, such as DOE. He is active in the American Society of Mechanical Engineers (ASME). He is currently a Member of ASME *Journal of Tribology*.

PROFESSIONAL SKILLS

1. HARDWARE

- Clean room hands on experiences for MEMS (photolithography, thin film growth (CVD and sol gel), metal deposition (E-vap, sputtering, Ebeam), etching (dry and wet) and wafer bonding.
- Experienced with design, fabrication, packaging, test and characterization of MEMS sensors & actuators and electronic nose system, proficient in the use of the following equipments:

  Contact Lithography, such as Suss Microtec contact aligners MA6 and MA8, resist spinners, hot plates, etc.

  Dry Etch Systems: Dry etch systems including Metal RIE, Silicon RIE, DRIE, Metal ICP, Xenon Difluoride etcher, and the Microwave Asher.
- In-depth knowledge of nano-fabrication and nano-tribology techniques, proficient in the use of the following instrumnets:
  Hysitron TriboIndenter® automated nanomechanical test system, SEM/EDX, AFM, XPS, XRD, AES, Wyko NT3000 DMEMS system, Pin-on-Disk tester, Ball-on-Three Flat tester, etc.

2. SOFTWARE

In-depth analysis of MEMS and nano-tribology techniques, proficient in the use of the following software:

- Experienced with MEMS design and simulation: L-Edit Pro V8.30;
- Familiar with CAD/CAM/FEM simulation software: ANSYS 10.0, AUTOCAD;
- Experienced with Engineering Computation software: MATLAB 7.5, OriginLab, etc;
- Experienced with LABVIEW programming;
- Windows, Microsoft Project, Word, Excel, and PowerPoint;
- Fluent in Mandarin (written & spoken) and English (written & spoken).

RESEARCH PROJECTS

- Department of Energy (DOE) Heavy Vehicle Systems Optimization Project (Prime Contract No.: DE-A105-000R21569), titled "Development of novel surface technology for needs of modern engines and drive trains to improve fuel economy and energy efficiency": Dr. Stephen M. Hsu.
- National Basic Research Program of China named 973 project titled "Theoretical and experimental studies of precision positioning of micro-actuator of hard disk drives in computer." Chief Specialist: Dr. Jianbin Luo.
- National postdoctoral foundation (2004) titled: Dr. Yang Jing.
- National High Technology Research and Development Program of China (863 Programs)'2000 titled "research of key technologies of solid lubricant films in Moon-landing robot joint": Dr. Lanying Zhou.
- National Natural Science Foundation of China'1999 titled: Dr. Jianbin Luo.
- National Science Fund for Distinguished Young Scholars'1998 titled: Dr. Jianbin Luo.

RESEARCH ACCOMPLISHMENTS

- Strong background skill on Multi-scale Mechanical Characterization and Nano-

indentation Techniques; Metal Forming and Forging Technology;

- ✶ Strong background knowledge about research of key technologies of solid lubricant films in Moon-landing robot joint;
- ✶ Strong knowledge about theoretical and experimental studies of precision positioning of micro-actuator of hard disk drives in computer;
- ✶ Strong background knowledge in surface metrology for textured surfaces for friction and contact control.

WORK EXPERIENCE AND RESEARCH ACTIVITIES

- ∗ **2007/10-present Research Scientist (Faculty), MAE in George Washington University**

  Working on Department of Energy (DOE) Heavy Vehicle Systems Optimization Project (Prime Contract No.: DE-A105-000R21569).
  Focus on Non-silicon Micro-fabricated Nano-structured compound surface textures for Heavy Vehicle Systems Application.

- ∗ **2005/11—2007/10 Guest Scientist, MSEL in National Institute of Standards & Technology**

  Pioneering works in compound multi-scale surface texture lubrication and the design & fabrication of multi-scale texture assemblies to control friction and wear brought new understanding to surface friction and wear control on Department of Energy (DOE) Heavy Vehicle Systems Optimization Project (Prime Contract No.: DE-A105-000R21569).

- ∗ **2005/5—2005/10 Assistant Professor, SKLT in Tsinghua University**

  Continuing engaged in National Basic Research Program of China named 973-project (Chief Specialist: Prof. Jianbin Luo).

  Team leader of a branch of 973 project (Chief Specialist: Prof. Jianbin Luo) for Theoretical and experimental studies of MEMS based precision positioning of micro-actuator of hard disk drives in computer.
  Dr. Jing was achieved optimum academic report award by State Key Laboratory of Tribology, Tsinghua University (2005).

- ∗ **2003/01—2005/04 Postdoctoral, State Key Laboratory of Tribology, Tsinghua University**

  Team leader of a branch of 973 project (Chief Specialist: Prof. Jianbin Luo) for Theoretical and experimental studies of MEMS based precision positioning of micro-actuator of hard disk drives in computer. This team was composed of different research institutes such as SAE technologies Ltd (TDK-SAE), Tsinghua University, and Institute of Acoustics, China Academy of Sciences (CAS) and finished the project as proposed on time.
  Achieved national postdoctoral foundation (2004), rated as extra-excellent by Tsinghua University in the period of postdoctoral (2004).

* **1995/05—2002/12 Lecturer, Beijing Institute of Technology**

  Worked in forging institute, Mechanical Engineering College, Beijing Institute of Technology and engaged in scientific research and teaching work. And have served as members of trade union organizations, members of publicity. Mainly engaged in state's 863 project: Research of key technologies of solid lubricant films in Moon-landing robot joint and outstanding achievements for his doctoral programs.

EDUCATION

* **Ph. D in Mechanical Engineering, Aug. 1999- Aug. 2002**

  Beijing Institute of Technology (BIT), Beijing, P. R. China
  Research of key technologies of solid lubricant thin-films in Moon-landing robot joints
  Advisor: Dr. Siqing Pang

* **M.S. in Mechanical Engineering, Aug. 1998-Aug. 1999**

  Beijing Institute of Technology (BIT), Beijing, P. R. China
  Research of key technologies of solid lubricant thin-films in Moon-landing robot joints
  Advisor: Dr. Siqing Pang

* **B. S. in Materials Science & Engineering, 1990-1994**

  Henan University of Science & Technology, Luoyang, P. R. China

HOBBIES

Badminton; Soccer; The game of "go"; Pop music; Computers

MEMBERSHIPS

* Membership since 2006, International Frequency Sensor Association (IFSA), certificate No. 20060815-001.
* Membership since 2006, Tribology of ASME Member, certificate No. 9229410.

PROFESSIONAL SERVICES

Peer Reviewer for the IEEE transactions on Ultrasonics, Ferroelectrics, and Frequency Control (TUFFC), Sensors and Actuators A: Physical (SNA) and International Conference on Precision Engineering and Micro/Nano Technology in Asia, etc over 12 papers since 2004.

PARTICIPATION AT SCIENTIFIC FORUMS AND CONFERENCES

* International Conference on Precision Engineering and Micro/Nano Technology in Asia. Reviewed papers for the conference. Shenzhen, China, November 12-14, 2005.
* World Tribology Congress □. Poster at Magnetic Storage Poster Session, Washington, D.C., September 12-16, 2005.
* Annual Meeting on Chinese Mechanical Engineering Society, 2004, Dalian, China. Paper presentation. "Characterization Analysis of a Piezoelectric Thin-Film Micro-

Actuator". Yang JING, Jianbin LUO, and Xinchun LU.

* TFC'03 National Thin-Films Technology Congress. Ningbo, Zhejiang, China. Paper presentation. "Tribological Properties of TiN-MoS_2/Ti Quasi-amorphous Thin Films". JING Yang, LUO Jianbin, PANG Siqin.
* Fundamental Technology for Innovation of Automation and Information Technology of Manufacturing Industry – Proceedings of Annual Meeting on CMES'01 and Proceedings of Academic Annual Meeting of Special Processing 2001. Paper presentation. "New Developments of the Knuckles Solid Lubricating Key Technology of Robots for Moon Exploring." Yang JING, Siqin PANG, and Lanying ZHOU.

TECHNICAL REPORTS

About 20+ technical reports written at George Washington University (2007-present), NIST (2005-2007) and Tsinghua University (2003-2005).

ACADEMIC HOUORS

* 2nd Tier Grant China Postdoctoral Science Foundation '04, P.R. China
* Check Achievement in Postdoctoral Period: Extra-Excellent '04, P.R. China
* National Invention Patents'04: 2 shares, P.R. China
* Academic Excellence Award '04, SKLT, Tsinghua University, P.R. China
* Head of class and student union (UHNST)

PATENTS

* **Y. Jing**, J. B. Luo, X.C. Lu. Fabrication of multi-layer piezoelectric thin-film elements applied for micro-actuators in hard disk drives, Invention Patent, China, 200410009092.6
* **Y. Jing**, J. B. Luo, X.C. Lu. Design and tape-casting fabrication of multi-layer piezoelectric elements applied for precise-placing micro-actuators, Invention Patent, China，200410009090.7

PUBLICATIONS

* **Y. Jing**, J. B. Luo, X. X. Yi, X. Gu. Design and Evaluation of PZT Thin-film Microactuator for Hard Disk Drives, Sensors and Actuators A: Physical, 116/2（2004）：329-335.
* **Y. Jing**, J. B. Luo, W. Y. Yang, G. X. Ju. Fabrication of Piezoelectric Ceramic Micro-actuator and Its Reliability for Hard Disk Drives , IEEE transactions on Ultrasonics, Ferroelectrics, and Frequency Control , 51/11（2004）：1470-1476.
* **Y. Jing**, J. B. Luo, et al., Structure and electrical properties of PMN-PZT micro-actuator deposited by tape-casting process, Sensors and Actuators A: Physical, 121/1（2005）：103-112.
* **Y. Jing**, J. B. Luo, et al., Fabrication and Ferroelectric properties of multilayer micro-actuator for hard disk drives application, Journal of Materials Science: Materials in

electronics, 16/5（2005）：287-294.

* **Y. Jing**, J. B. Luo, P. S. Huang, L. Qin. U-type piezoelectric thin-film microactuator for hard disk drives, IEEE Transactions on Magnetics, 41/11,（2005）：4309-4314.
* **Y. Jing**, J. B. Luo. Tape casting processing of multilayer piezoelectric elements for U-type micro-actuator application, Journal of Electroceramics, 2005, revised.
* **Y. Jing**, J. B. Luo, S. Q. Pang. Effect of Ti or TiN co-deposition on the performance of MoS_2-based composite coatings, Thin Solid Films, 461/2（2004）：288-293.
* **Y. Jing**, J. B. Luo, S. Q. Pang. Tribological Performance of MoS_2-Based Coatings After Deposition and Storage in Humid Air, Journal of Wuhan University of Technology: Materials Science, 19 (suppl.) (2004)：45-48.
* **Y. Jing**, J. B. Luo, T. M. Shao. Thickness and processing effects on the composition and actuating force of $Pb(Zr,Ti)O_3$ thin-film micro-actuator for Hard Disk Drives，WTC'2005 world Tribology Congress □, published.
* **Y. Jing**, J. B. Luo, S. Q. Pang. Effect of Ti or TiN Additives on the wear-resisting property of MoS_2-based coatings. Journal of Beijing Institute of Technology, 24(6)(2004): 504-507.（In Chinese）
* **Y. Jing**, J. B. Luo, S. Q. Pang. Tribology properties of TiN-MoS_2/Ti composite coatings. Journal of Tsinghua University (Science and Technology), 44(8)(2004): 1029-1031.（In Chinese）
* **Y. Jing**, J. B. Luo, X. H. Zhang, L. Zhang. Fabrication and finite element analysis of piezoelectric thick-film micro-actuator for hard disk drives. Journal of Beijing Institute of Technology, 24(12)(2004): 1045-1048.（In Chinese）
* **Y. Jing**, J. B. Luo. Fabrication and analysis of PMN-PZT multilayer thick-film micro-actuator. Chinese journal of mechanical engineering, 41(3)(2005): 107-111.（In Chinese）
* **Y. Jing**, J. B. Luo, X. X. Yi, P. S. Huang. Fabrication and investigation of piezoelectric thin-film micro-actuator for hard disk drives. Journal of Tsinghua University (Science and Technology), 45(5)(2005): 618-621.（In Chinese）
* **Y. Jing**, J. B. Luo, X. C. Lu, L. Zhang. Study on Fabrication and Properties for a Novel Micro-actuated Element. China Mechanical Engineering, 16(24), 2005: 2222-2226.（In Chinese）
* **Y. Jing**, J. B. Luo, X. C. Lu. Preparation and properties of piezoelectric elements by sol-gel process for micro-actuator application. Piezoelectrics & Acoustoopics, 28(2), 2005: 147-149.（In Chinese）
* **Y. Jing**, L. Y. Zhou, S. Q. Pang. XPS investigation of largely etching of S from the TiN-MoS_x/Ti composite coating under plasma treatments. Journal of Beijing Institute of Technology, 21(6)(2001): 689-693.（In Chinese）
* **Y. Jing**, S. Q. Pang, X. H. Zhang, C. J. Xu. Tribological performance investigation of TiAlN-MoS_x/TiAlN rigid composite coatings. Journal of Beijing Institute of Technology,

22(4)(2002): 457-459.（In Chinese）

* **Y. Jing**, S. Q. Pang, S. D. Zhong, L. Y. Zhou. Tribological performance and composition of MoS_2-based composite coatings after storage. Journal of Beijing Institute of Technology, 22(1)(2002): 28-31.（In Chinese）
* **Y. Jing**, S. Q. Pang, L. Y. Zhou, S. D. Zhong. Influence of processing parameters on the chemical composition and performance of TiN_2MoS_2/ Ti composite coatings deposited by nano-composite plating technology, ACTA ARMAMENTARII, 23(3)(2002): 395-398.（In Chinese）
* **Y. Jing**, S. Q. Pang, L. Y. Zhou, X. H. Zhang. Investigation on the bonding strength and other properties between different substrates and composite coatings, ACTA ARMAMENTARII, 23(4)(2002): 517-520.（In Chinese）
* **Y. Jing**, J.B. Luo, W.Y. Yang. Fabrication and drive characteristics of piezoelectric ceramic micro-actuator for hard disk drives, ACTA ARMAMENTARII, 26(1)(2005): 77-81.（In Chinese）
* **Y. Jing**, J. B. Luo, S.Q. Pang. Tribological investigation of Ti-MoS_2/Ti quasi-noncrystal thin-films, TFC'2003 National Thin-Films Technology Congress, 68.（In Chinese）
* **Y. Jing**, L. Y. Zhou, S. Q. Pang. New progress of solid lubrication technology for different applications. Proc. of the □ International symposium on Moon Exploring, 2001: 102-109.（In Chinese）
* **Y. Jing**, J. B. Luo. Fabrication and properties of piezoelectric thick-film micro-actuator. Proc. of Annual Meeting on CMES'04，2004: 210-213.（In Chinese）
* **Y. Jing**, S. Q. Pang, L. Y. Zhou. New progress of solid lubrication technology for the knuckles of moon exploring robots, Proc. of Annual Meeting on CMES'01, 2001: 460-463.（In Chinese）
* L. Y. Zhou, **Y. Jing**, etc. China's space development strategy to explore the machinery lubrication technology, space robots and remote collection of science and technology development strategy seminar, 2000: 10. (In Chinese)
* **Y. Jing**, J. B. Luo, S. Q. Pang. Tribological analysis of MoS_2-based thin films in deposition and in storage. Proc. of Foreground and Challenge of Mechanical Science and Technology, 2003：121-122.（In Chinese）
* L. Y. Zhou, **Y. Jing**, C. M. Han. Research on solid lubrication technologies for the knuckles of moon exploring robots. Report of Chinese Defense Science and Technology, 2701, 2001.（In Chinese）