

EDUCATION

Stanford University	Postdoc,	Mechanical Engineering	12/00 – 02/02
Technical University Berlin, Germany	Ph.D.,	Physical Engineering	11/91- 01/99
East China Univ. of Science and Technology	M.Sc.,	Chemical Engineering	09/85 - 09/88
Northwest University, Xian/China	B.Sc.,	Chemical Engineering	02/79 - 01/83

Strong background in multidisciplinary fields of biochips based on nano/microfluidic technology, diagnostic system for chemical/biological agents, biomedical devices, optical measurement method, bioreactor, fluid dynamics, turbulence, mixing and etc.

WORK EXPERIENCES

08/07-present **Assistant Professor**, Mechanical Engineering Department & Biomedical Engineering Program, **University of South Carolina, Columbia, SC, USA**

11/05-11/06 **Adjunct Professor**, Chemical Engineering Department, University of Alabama, Huntsville, USA.

2/03-07/07 **Principal research engineer**, Biomedical Tech. Branch, **CFD Research Corp**, Huntsville, AL

3/02-1/03 **Senior Engineer**, **Amphora Discovery Corp**, Mountain View/CA

12/00 – 2/02 **Postdoctoral Fellow**, Mechanical Engineering Department, **Stanford University**

12/99 – 11/00 **R&D manager**, **Grace Fluids Engineering**, Mississauga, ON. Canada

02/99–11/99 **Research Scientist**, R&D group, **M&I Air Systems Engineering**, Mississauga, ON. Ca.

12/91 – 01/99 **Research Assistant**, Hermann-Foettinger-Institute, **Technical University Berlin**, Germany

4/83 - 8/85 and 10/88 - 5/90, **Lecturer**, Dept. of Petrol. Chem. Eng., **Liaoning University of Petrol. & Chem. Tech.** China

9/85 – 9/88 **Research Assistant**, Chem. Eng. Dept. **East China University of Science and Technology**, China

PAST RESEARCH PROJECTS

- DARPA/(SBIR): W31P4Q-07-C-0035 12/06-06/07 Role: **Principle Investigator**
Novel Nanofluidics-Based Sensor System

Specific Aim: To design, fabricate and demonstrate nanoelectrophoresis in nanochannel to preconcentrate and separate sample to enhance sensitivity for chemical and biological sensor.

- NIH/SBIR: 1R43NS050011-01 9/04 – 09/05 Role: **Principle Investigator**
A Novel Micro Thrombectomy Catheter for Ischemic Stroke

Specific Aim: To design, fabricate and demonstrate a novel MEMS based thrombectomy catheter to treat acute ischemic stroke by increasing clinical safety and reducing cost.

- OSD(DoD)/SBIR: W81XWH06C0067 12/05 – 01/06 Role: **Principle Investigator**
Novel Miniaturized, Electrothermal Activated, Optically Controlled, High throughput Noninvasive Drug Infusion Pump

Specific Aim: To design, fabricate and demonstrate an electrothermal traveling wave micropump to increase throughput of drug delivery with precisely inline monitoring and control of the drug flow rate.

- HSARPA (SBIR): 06/05–12/06 04/06–03/08 Role: Co-Investigator
A Novel Electrokinetics-Driven, Integrated Microfluidic Cartridge for Sample Preparation from Complex Matrices

Specific Aim: To develop an integrated microfluidic cartridge (including cell sorter, cell lysis and DNA extraction and fluorescence detection) for biological agent detection against bioterrorists' attack.

- MCSC/(SBIR): 11/02 – 09/03 01/04–01/06 Role: Co-Investigator

A Novel, Microfabricated, Electro-Immuno, Integrated Sensor-Sampler for Bioagent Collection and Detection

Specific Aim: To design, fabricate and demonstrate a microfluidics based biosensor for environmental detection

- DHS S&T/HSARPA: NBCHC040110 04/04 – 10/04 Role: Co-Investigator

A Novel Low Power, High Throughput, High Efficiency, Scalable Electrostatic Bioaerosol Sampler

Specific Aim: To develop a low power, high throughput, high efficiency and scalable electrostatic bioaerosol sampler for biosample collection and preparation in a detection system.

- NIH/SBIR 2RH HL64500-02A1/03 09/02–10/05 Role: Co-Investigator

Development of Improved Pediatric Spacer for Inhalers

Specific Aim: To develop an inhaler with passive flow controlled pediatric spacer for drug delivery.

ACADEMIC AREAS OF INTEREST AND RESEARCH METHODS

Nanotechnology, BioMEMS and Lab-on-a-Chip

- Nanofluidics: Nanoelectrophoresis sample preconcentration and separation,
- Electrokinetics: (electrohydrodynamic instability, traveling wave electrothermal pump, dielectrophoresis for cell and particle separation, electroporation)
- Components and integration in nano/microfluidics: pump, sample injection, valve, filter, dispenser, mixer, reactor, separator, cell lysis under electric field, transducer and etc
- Optofluidics: Optical diagnostics in nano/microfluidics system
- Hybrid of microarray with nano/microfluidics
- Using microfluidic chip for signal transduction, proteomics, cellomics, cell assay, protein folding

Tissue engineering and biomaterials

- Bioreactor for tissue engineering, cell culture, fermentation, extraction, manufacturing of protein, pure plasmid DNA and etc; microreactor
- Miniaturized mixing/dispensing system for high viscosity polymers in combinatorial and high-throughput approaches for biomaterials, nanoparticle manufacturing

Biomedical devices

- Nano/microfluidic instruments for physiology, pathology and clinical diagnostics
- Tissue cutting: Micro thrombectomy catheter for clot breakup in cardiovascular system, such as acute ischemic stroke, hemodialysis arterio-venous (AV) grafts and fistulae, tissue cutting and etc
- Drug delivery: Pulmonary drug delivery; ultrasound and microbubble enhanced gene and drug delivery, nanoparticle drug delivery.

Experimental measurement

- Stimulation emission depletion
- Velocimetry based on laser-induced fluorescence photobleaching for microfluidics

Biofluid mechanics

- Applying modern flow control and receptivity to study biofluid mechanics and application in life science
- Fluid dynamics, turbulence, heat and mass transfer enhancement

PUBLICATIONS

Book

Wang, G. R. (2000) Turbulent mixing, stability and secondary flow in a confined configuration. Wissenschaftliche Schriftenreihe Stroemungstechnik, Bd. 8. ISBN 3-89574-376-3, Verlag Dr. Koester.

Patents

- 1 Wang, G. R.; Jiang, H. (2007) Method and Apparatus for fluid velocity measurement based on photobleaching. US patent, 7283215B2.
- 2 Wang, G.; Sundaram, S.; Pant, K.; Feng J, P. Storm (2006) MEMS based microcatheter for thrombectomy. Submitted to US patent (pending).
- 3 Krishnamoorthy, S.; G **Wang**; Feng J. (2006) Travelling wave electrothermal pump. Submitted to US patent (pending).
- 4 Pant, K.; G **Wang**; JJ Feng; S. Krishnamoorthy; S. Sundaram (2005) Electrostatic sampler and method. Submitted to US Patent (Pending).
- 5 Feng, J. J.; Guiren **Wang**, Kapil Pant, Shankar Sundaram (2005) Method and Apparatus for Separating Particles by Dielectrophoresis. Submitted to US Patent, 11/167428 (Pending).
- 6 Fiedler, H. E.; **Wang**, G. R. (1998a) A new process for rapid and homogeneous mixing of fluids in continuous operations (in German). Deutsches Patent No. 19816354.1.
- 7 Fiedler, H. E.; **Wang**, G. R. (1998b) Anemometer based on the effect of photobleaching (in German). Deutsches Patent. No. 19838344.4.
- 8 Fiedler, H. E.; **Wang**, G. R. (1998c) Efficient heat exchanger through confined symmetric and asymmetric wakes in a pipe (in German). Deutsches Patent. No. 19850190.0.

Journals

1. Zhao, W; Li, WP; **Wang, GR** The parameters of She-Leveque scaling law of local turbulent energy dissipation in near-wall turbulence. *Submitted for publication*.
2. Cuifang Kuang, Wei Zhao, **G. Wang** Ultrahigh temporal resolution velocimetry for lab-on-a-chip. Submitted to *Lab on a Chip*.
3. Kuang, CF; Zhao, W; Yang, F. and **Wang, G.** The risetime of electroosmotic flow in microchannels. Submitted for publication.
4. Wang, Y; Pant, K.; Chen, Z.; **Wang, G.**; Diffey, WF; Ashley, P. Shivshankar Sundaram Numerical analysis of electrokinetic transport in micro-nanofluidic interconnect preconcentrator in hydrodynamic flow. *Microfluidics and nanofluidics*. In press.
5. Kuang, CF; Zhao, W; Yang, F. and **Wang, G.** Measuring flow velocity distribution in microchannels using molecular tracers. *Microfluidics and nanofluidics*. In press.
6. Wang, G.R; Sas, I; Jiang, H; Janzen, W.P; Hodge, C.N. (2008) Testing Microfluidic Instruments Using a Novel Method for Measuring Fluid Flow Rates. *Electrophoresis*. 29, 1253–1263.
7. Jinag, H; **Wang, G.R.** (2008) Thermocapacitive Flow Sensor. In. Li, Dongqing (ed) *Encyclopedia of Microfluidics and Nanofluidics*. 2025-2032.
8. Wang, G. R. (2005) On large structures and turbulent mixing in confined mixing layers under forcing. *AIChEJ*. 52, 111-124.
9. Wang, G. R. (2005) Laser-induced fluorescence photobleaching anemometer for microfluidic devices. *Lab on a Chip*, 5, 450 – 456.
10. Wang, G. R., Santiago, J. G., Mungal, M. G. Yang, B., & Papademetriou S., (2004) A laser induced cavitation pump. *Journal of Micromechanics and Microengineering*. 14, 1037-1046.
11. Wang, G. R. (2003) A rapid mixing process in continuous operation under periodic forcing. *Chemical Engineering Science*. 58, 4953-4963.
12. Wang, G. R.; Fiedler, H. E. (2000) On high spatial resolution scalar measurement with LIF. Part 1: Photobleaching and Thermal Blooming. *Experiments in Fluids*. 29, 257-264.
13. Wang, G. R.; Fiedler, H. E. (2000) On high spatial resolution scalar measurement with LIF. Part 2: The Noise Characteristics. *Experiments in Fluids*. 29, 265-274.
14. Dai, G. C., **Wang, G. R.**, Fan, Z. H. (1989a) Transition from laminar to turbulent flow in artificially roughened pipes. *J. East China Institute of Chemical Technology*. 15, 580-584.
15. Dai, G. C., Fan, Z. H, **Wang, G. R.** (1989b) Flow resistance in repeated-rib tubes. *Ibid*, 15, 300-304.

16. Fan, Z. H, Dai, G. C., Jin, D. Y., **Wang**, G. R. (1989c) Turbulent flow in artificially roughened pipes. *Ibid*, **15**, 305-312.
17. Wang, G. R; Zhang, B. G. (1984) Study of heat transfer of the horizontal immersed tubes in fluidized beds. *J. Fushun Petroleum Institute. No. 2.*

Conferences papers and presentation

- 1 Kuang, CF, **Wang**, GR, (2008) Study on the rise time of electroosmotic flow in microcapillary tubes. 60th Annual Meeting of the Division of Fluid Dynamics, San Antonio, Texas. November 23–25, 2008.
- 2 Wang, G.R, Jiang, H. (2008) Mixing Phenomenon in a Confined Plane Wake in a Pipe. 6th International Symposium on Mixing in Industrial Processes (ISMIP6), August 17-21, 2008, Niagara Fall, Canada.
- 3 Kapil Pant, Guiren **Wang**, Balabhaskar Prabhakarpanthian and Shivshankar Sundaram (2007) Electric Field Driven Lysis of Gram-Positive Bacterial Cells. The 2007 Scientific conference on chemical & biological defense research. Nov. 13-15, 2007, Timonium, Maryland, USA.
- 4 Wang, G.R.; Jiang, H. (2007) Symmetric breaking hysteresis in a plane wake. 60th Annual Meeting of the Division of Fluid Dynamics, Salt Lake City, Utah. *Bull. Am. Phys Soc. Vol 52.*
- 5 Guo, Junpeng.; Guiren **Wang**; David J. Brady (2006) Super-Resolution Mapping of Flow Velocity Distribution in Nanofluidic Channels. *Frontiers in Optics/Laser Science XXII*, The 90th Optical Society of America Annual Meeting. Oct. 8-12, 2006, Rochester, New York, USA.
- 6 Wang, G.R; Pant, K; Storm, P; Feng, J; Prabhakarpanthian, B; Sundaram, S; (2006) Piezo-actuated Mechanical Thrombolysis Microcatheter for Acute Ischemic Stroke. *BMES Annual Fall Meeting*, Oct. 11-14, 2006, Chicago, IL.
- 7 Wang, G.R.; J. Guo; Y. Lin, J. Feng, J. Wei, Y. Wang; S. Krishnamoorthy; S. Sundaram (2006) Laser-Induced Fluorescence Photobleaching Anemometer for Flow Velocity Measurement in Sub-Microscale Fluidic Channels. *IEEE Lasers and Electro-Optics Society, Summer Topical Meetings*, 17 – 19 July 2006, Quebec City, QC, Canada.
- 8 Feng, J. J.; S. Krishnamoorthy, G. W. **Wang**, and S. Sundaram (2006) Simulation of Electrokinetic Flow and Analyte Transport in Nano Channels. *NSTI-Nanotech*, Vol. 2, 505-508, May 7-11, 2006, Boston, Massachusetts, U.S.A.
- 9 Wang; G. R.; J.J. Feng; S. Vasantgadkar; K. Pant; B. Prabhakarpanthian; S. Krishnamoorthy; S. Sundaram (2006) A Continuous Particle/Cell Sorter Using Dielectrophoresis. *NSTI-Nanotech 2006*, Vol. 2, 570-573, May 7-11, 2006, Boston, Massachusetts, U.S.A.
- 10 K. Pant, J. Feng, G. **Wang**, S. Krishnamoorthy and S. Sundaram (2004) Separation of bioparticulate matter using traveling wave dielectrophoresis. *7th International Conference on Miniaturized Chemical and Biochemical Analytical Systems*, October 5-9, 2003, Squaw Valley, California USA. Pp 1207-1210.
- 11 Wang, G. R.; J. G. Santiago; M. G. Mungal (2002) Interaction between laser-induced cavitation flow and a micro tube: micro pumping effect. *Annual Thermal And Fluid Science Affiliate Conference*, Stanford, CA, Feb. 2002.
- 12 Wang, G. R.; Santiago, J. G.; Mungal, M. G. (2001) Some visualization observations of laser induced cavitation flow. *Bull. Am. Phys Soc. Vol 44.*
- 13 Wang, G. R., Fiedler, H. E. (1999e) On turbulent mixing in a confined mixing layer in a pipe. *17th Biennial North American Mixing Conference*. Banff, Alberta, Canada.
- 14 Wang, G. R.; Fiedler, H. E. (1998d) A new receptivity mechanism in a confined configuration. *Bull. Am. Phys Soc. Vol 43.*
- 15 Wang, G. R.; Fiedler, H. E. (1998e) Scalar power spectral density in a confined wake in a pipe. *Bull. Am. Phys Soc. Vol 43.*
- 16 Wang, G. R.; Spieweg, R.; Fiedler, H. E. (1998f) Turbulent mixing in a confined plane wake in a pipe. *Bull. Am. Phys Soc. Vol 43.*
- 17 Wang, G. R.; Fiedler, H. E. (1998g) On high spatial resolution scalar measurement with LIF. *Bull. Am. Phys Soc. Vol 43.*
- 18 Wang, G. R.; Fiedler, H. E. (1998h) On turbulent mixing criterion. *AIChE 1998 Annual Meeting, Miami.*
- 19 Wang, G. R.; Fiedler, H. E. (1998i) A new flow for an ideal mixed reactor. *Ibid.*
- 20 Wang, G. R., Fiedler, H. E. (1997) Some new observations in a confined plane wake in a pipe. *The 2nd International Science of Fluid Mechanics and Art Conference*. Berlin.
- 21 Wang, G. R., Fiedler, H. E. (1996) Paring burst - a new phenomenon. *Bull. Am. Phys Soc. Vol 41.*

AWARD Industrial Fellowship from Material and Manufacturing Ontario, Canada.

1999

SYNERGISTIC ACTIVITIES

- Served on NSF proposal review panels
- Served on NIH proposal review panels

REVIEWER FOR JOURNAL

AICHE Journal

Electrophoresis

Journal of Microelectromechanical Systems.

Lab-on-a-Chip

Microfluidics and nanofluidics

Sensor and Actuator B

INVITED PRESENTATION

University of Alabama in Huntsville, Hudson Biotechnology Seminar Series, 2004.

HOBBY Tai Qi Chuan, Calligraphy