

TIANNAN GUAN

PHD RESEARCHER, MEMS ENGINEER

Kasteelpark Arenberg 10 | Mobile: +32(0)485 97 72 01
B-3001 Leuven, Belgium | tiannan.guan@esat.kuleuven.be

SPECIALTIES & EXPERTISE

5 years hands-on cleanroom working experiences

Specialties on MEMS Design, Simulation, Fabrication, Packaging and Testing

Design: Cadence (Virtuoso), CleWin

Simulation: CoventorWare, COMSOL Multiphysics

Fabrication:

Mask Production: Photomask, LaserWriter (LW405 MICROTECH)

Thin Film Deposition: Polymer, Dielectric, Metal on planar/nonplanar surfaces

- Spin coating (EC 101 Headway Research)
- Spray coating (EVG 101 OmniSpray)
- Si thermal oxidation (HiTech benchtop furnace)
- Thermal evaporation (MED 010 Balzers)
- Sputtering deposition (8620 Materials Research Corp. & BAE 370 Balzers)

Lithography: EVG 620 double sided mask aligner & MJB 55 Karl Süss

Etching: Safety trained, qualified to work with highly hazardous chemicals

- Critical point dryer (Tousimis Autosamdri 815B)
- Reactive-ion etching (Plasma Tech)
- Genre wet etching

Packaging:

- Anodic bonding
- Flip chip bonding (FCM manual flip chip bonder Karl Süss)
- Parylene coating (Labcoater 220 Plasma Parylene Systems)
- PDMS biocompatible packaging

Testing:

Microscopy:

- SEM (Philips XL30)
- Optical (Zeiss Axio M1m, Keyence VHX600, Mitutoyo QuickVision 3D)
- Thermal imaging (FLIR SC5650)

Profilometer: Surface profiler (Dektak 3030, Dektak XT)

PCB: LTspice, Altium Designer, Cu etching (Rota Spray etch system), soldering

WORK EXPERIENCE

Doctoral Researcher

2009 to present

Department of Electrical Engineering, KU Leuven, Belgium

Designed and fabricated sensors and actuators based on various polymer materials. Explored functioning polymers for MEMS applications. Including but not limited to hydrogels and epoxies.

Lithographic crosslinkable hydrogels for MEMS applications

- Developed hydrogel chemical sensors based on different stimuli sensitivities.
- Designed and fabricated an in-plane tunable microlens platform capable of intensity modulation up to a factor of 8.

Photopatternable epoxies for optical sensors

- Developed a polymer optical platform for MEMS applications.
- Fabricated and spectral analyzed straight, Y-junction and Mach-Zehnder types of waveguides.
- Designed a built-in fiber clamp system to provide both in-plane and out-of-plane clamping of fibers.

- Built variable optical attenuators, both the thermo-optical attenuator and opto-mechanical attenuator.
- Developed an optical accelerometer.

Projects

PolymAct-SBO (Strategic basic research)

- Inter-university corporation with IMEC and Universiteit Gent.
- Developed photolithographic micromachining process for stimuli sensitive hydrogels.
- Characterized smart hydrogels' behaviors at microscale.
- Designed and fabricated hydrogel based actuators and chemical sensors (pH, temperature, ionic strength).

ELOMAT

- Intra-university corporation with Department of Physics and Department of Materials Engineering
- Developed MEMS compatible fabrication processes for PMMA-DR1 (polymethylmethacrylate-Disperse Red 1) polymer composite. Developed both dry etching and wet etching techniques with sub-micron resolution.
- Designed and built testing setups for piezoelectric materials. Built piezo stack actuator, load cell readout circuit, and a PCB charge amplifier which has high pass filter, differential amplifier and notch filter.

EDUCATION

Ph.D., Electrical Engineering

2009 to present

Katholieke Universiteit Leuven, Belgium

- MicroElectroMechanical Systems (MEMS), Dec 2013 (expected)
- Dissertation: Functional Polymers for Microsystems: Micromachining and Applications
- Promotor: Prof. Dr. Ir. Robert Puers

Erasmus Mundus Master of Nanoscience and Nanotechnology

2007 to 2009

Katholieke Universiteit Leuven, Belgium

- M.Eng., Nanotechnology, cum laude
- Dissertation: An Optical, Plastic MEMS Accelerometer

Technische Universiteit Delft & Universiteit Leiden, The Netherlands

- M.Sc., Nanoscience

B.Sc., Applied Physics

2003 to 2007

Shanghai Jiao Tong University, China

- with honours
- Dissertation: Growth and Properties of Melt-textured REBCO Grains Seeded by Homogenous Thin Film

MANAGERIAL SKILLS

Master Thesis Supervision

Topic: Miniature Implantable Pulse Oximetry
2012-2013

Teaching Assistance

Microsystems and Sensors: Exercises and Laboratory Sessions (B-KUL-H06D0a)
80+ students, 2010 and 2012

LANGUAGES

English: Full professional proficiency

Mandarin: Native proficiency

HONORS & AWARDS

Erasmus Mundus Master, scholarship granted by the European Commission
Doctoral candidate, KU Leuven scholarship

COMPUTER SKILLS

Engineering: Solid Edge, Maple, Origin, Matlab
Administration: Windows XP, Mac OS X, Linux (CentOS), L^AT_EX

VERBAL SKILL

Presentations

5 oral and poster presentations at major international conferences

- Transducers 17th & Eurosensors XXVII, Barcelona, Spain, 2013 (*poster/oral*)
- Eurosensors XXVI, Krakow, Poland, 2012 (*oral/podium*)
- Transducers 16th, Beijing, China, 2011 (*poster/oral*)
- Eurosensors XXV, Athens, Greece, 2011 (*poster/oral*)
- Eurosensors XXIV, Linz, Austria, 2010 (*poster/oral*)

WRITTEN SKILL

Publications

3 top international peer-reviewed journal publications

6 major international conference proceedings

- **T. Guan**, G. Keulemans, F. Ceyssens and R. Puers, "MOEMS uniaxial accelerometer based on EpoClad/EpoCore photoresists with built-in fiber clamp", *Sensors and Actuators A: Physical* 195 (2013) 95-102
- **T. Guan**, F. Ceyssens and R. Puers, "Fabrication and testing of a MEMS platform for characterization of stimuli-sensitive hydrogels", *Journal of Micromechanics and Microengineering* 22 (2012) 087001
- **T. Guan**, F. Godts, F. Ceyssens, E. Vanderleyden, K. Adesanya, P. Dubruel, H. P. Neves and R. Puers, "Development and fabrication of a novel photopatternable electric responsive Pluronic hydrogel for MEMS applications", *Sensors and Actuators A: Physical* 186 (2012) 184-190
- **T. Guan**, F. Ceyssens and R. Puers, "Polymer MOEMS Accelerometer", *Procedia Engineering* 47 (2012) 120-123
- **T. Guan**, F. Ceyssens and R. Puers, "Conductometric and optical sensing of stimuli sensitive hydrogels inside microfluidic channels", *Solid-State Sensors, Actuators and Microsystems Conference (TRANSDUCERS), 2011 16th International*, 1264-1267
- **T. Guan**, F. Godts, F. Ceyssens, P. Dubruel, H. P. Neves and R. Puers, "Micropatterning and dynamic swelling of photo-crosslinkable electroactive Pluronic hydrogel", *Procedia Engineering* 25 (2011) 856-859
- B. Chaudhri, F. Ceyssens, **T. Guan**, A. La Manna, H. P. Neves, C. Van Hoof and R. Puers, "High Strength, Polymer Microneedles For Transdermal Drug Delivery", *Procedia Engineering* 25 (2011) 1377-1380
- **T. Guan** and R. Puers, "Thermal analysis of a Ag/Ti based microheater", *Procedia Engineering* 5 (2010) 1356-1359
- H. De Doncker, **T. Guan**, M. Driesen and R. Puers, "Biaxial and Uniaxial Epoxy Accelerometers", *Procedia Chemistry* 1 (2009) 572-575