

HONORS AND AWARDS

- **CTCI Science and Technology Research Scholarship**, CTCI Foundation Dec. 2014
- **Honorable Mention**, the 18th Micro and Nano System Technology Conference Aug. 2014
- **2014 CIC Outstanding Chip Design Award: Best Design** Aug. 2014
- **2nd Place, NTHU iNEMS Student Paper Competition (Oral Presentation)** May. 2014
- **2013 CIC Outstanding Chip Design Award: Honorable Mention** Aug. 2013
- **3rd Place, NTHU iNEMS Student Paper Competition (Oral Presentation)** Jun. 2012
- **President's Fellowship**, National Tsing Hua University Nov. 2011
- **2011 CIC Outstanding Chip Design Award: Best Design** Aug. 2011
- **Member of Phi Tau Phi Honor Society** Jun. 2011
- **Best Student Paper Award**, 2011 IEEE IFCS-EFTF Joint Conference May. 2011
- **2nd Place, NTHU iNEMS Student Paper Competition (Oral Presentation)** May. 2010
- **Outstanding Engineering Student Scholarship**, Chinese Institute of Engineers Jun. 2009
- **President's Award** of National Chung Cheng University (CCU), *Six times* Feb. 2006 – Jun. 2009

PUBLICATIONS

Journal Articles:

- [1] **M.-H. Li**, C.-Y. Chen, C.-S. Li, C.-H. Chin, and S.-S. Li, "A monolithic CMOS-MEMS oscillator based on an ultra-low-power ovenized micromechanical resonator," *J. Microelectromech. Syst.*, 2014. ***In Press***
- [2] **M.-H. Li**, C.-Y. Chen, C.-S. Li, C.-H. Chin, and S.-S. Li, "Design and characterization of a dual-mode CMOS-MEMS resonator for TCF manipulation," *J. Microelectromech. Syst.*, 2014. ***In Press***
- [3] C.-S. Li, **M.-H. Li**, C.-C. Chen, C.-H. Chin, and S.-S. Li, "A low voltage CMOS-MicroElectroMechanical Systems thermal-piezoresistive resonator with $Q > 10,000$," *IEEE Electron Device Lett.*, vol. 36, no. 2, pp. 192-194, Feb. 2015.
- [4] C.-S. Li, **M.-H. Li**, and S.-S. Li, "Differentially piezoresistive transduction of high- Q encapsulated SOI-MEMS resonators with sub-100nm gaps," *IEEE Trans. Ultrason. Ferroelect. Freq. Contr.*, vol. 62, no. 1, pp. 220-229, Jan. 2015.
- [5] C.-H. Chin, C.-S. Li, **M.-H. Li**, Y.-L. Wang, and S.-S. Li, "Fabrication and characterization of a charge-biased CMOS-MEMS resonant gate field effect transistor," *J. Micromech. Microeng.*, vol. 24, no. 9, pp. 095005, 2014. **(2014 JMM highlighted paper)**
- [6] C.-Y. Chen, **M.-H. Li**, C.-S. Li, and S.-S. Li, "Design and characterization of mechanically coupled CMOS-MEMS filters for channel-select applications," *Sens. Actuators A: Phys.*, vol. 216, pp. 394-404, Sep. 2014.
- [7] C.-S. Li, **M.-H. Li**, C.-H. Chin, and S.-S. Li, "Differentially piezoresistive sensing for CMOS-MEMS resonators," *J. Microelectromech. Syst.*, vol. 22, no. 6, pp. 1361-1372, Dec. 2013.
- [8] Y.-C. Liu, M.-H. Tsai, W.-C. Chen, **M.-H. Li**, S.-S. Li, and W. Fang, "Temperature-compensated CMOS-MEMS oxide resonators," *J. Microelectromech. Syst.*, vol. 22, no. 5, pp. 1054-1065, Oct. 2013.
- [9] V. Pachkawade, **M.-H. Li**, C.-S. Li, and S.-S. Li, "A CMOS-MEMS resonator integrated system for oscillator application," *IEEE Sens. J.*, vol. 13, no. 8, pp. 2882-2889, Aug. 2013.
- [10] **M.-H. Li**, W.-C. Chen, and S.-S. Li, "Realizing deep-submicron gap spacing for CMOS-MEMS resonators," *IEEE Sens. J.*, vol. 12, no. 12, pp. 3399-3407, Dec. 2012.
- [11] Y.-C. Lee, **M.-H. Li**, W. Hsu, Y.-T. Cheng, and S.-S. Li, "Electroplated Ni-CNT Nanocomposite for Micromechanical Resonator Applications," *IEEE Electron Device Lett.*, vol. 33, no. 6, pp. 872-874, Jun. 2012.
- [12] W.-C. Chen, **M.-H. Li**, Y.-C. Liu, W. Fang, and S.-S. Li, "A fully-differential CMOS-MEMS DETF oxide resonator with $Q > 4,800$ and positive TCF," *IEEE Electron Device Lett.*, vol. 33, no. 5, pp. 721-723, May 2012.
- [13] **M.-H. Li**, W.-C. Chen, and S.-S. Li, "Mechanically-coupled CMOS-MEMS free-free beam resonator arrays with enhanced power handling capability," *IEEE Trans. Ultrason. Ferroelect. Freq. Contr.*, vol. 59, no. 3, pp. 346-357, Mar. 2012. **(Featured as the front cover)**

Conference Proceedings:

- [1] C.-Y. Chen, C.-H. Chin, **M.-H. Li**, and S.-S. Li, "Statistical characterization of a CMOS-MEMS resonator for monolithic ovenized oscillator applications," in *Tech. Dig.*, 18th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'15*), Alaska, USA, June 21-25, 2015 (**Accepted**).
- [2] C.-Y. Chen, **M.-H. Li**, C.-H. Wang, and S.-S. Li, "Transduction comparison of a resonant transducer realized in a commercially available CMOS-MEMS platform," in *Tech. Dig.*, 18th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'15*), Alaska, USA, June 21-25, 2015 (**Accepted**).
- [3] J. Ren, C.-Y. Liu, **M.-H. Li**, C.-C. Chen, C.-Y. Chen, C.-S. Li, and S.-S. Li, "A mode-matching 130-kHz ring-coupled gyroscope with 225 ppm initial driving/sensing mode frequency splitting," in *Tech. Dig.*, 18th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'15*), Alaska, USA, June 21-25, 2015 (**Accepted**).
- [4] H.-C. Su, **M.-H. Li**, C.-Y. Chen, and S.-S. Li, "A single-chip oscillator based on a deep-submicron gap CMOS-MEMS resonator array with high-stiffness driving scheme," in *Tech. Dig.*, 18th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'15*), Alaska, USA, June 21-25, 2015 (**Accepted**).
- [5] **M.-H. Li**, C.-S. Li, and S.-S. Li, "Exploring the Q -factor limit of temperature compensated CMOS-MEMS resonators," in *Proc.*, 28th IEEE Int. Conf. Micro Electro Mech. Syst. (*MEMS'15*), Estoril, Portugal, Jan. 18-22, 2015, pp. 853-856.
- [6] C.-H. Chin, C.-S. Li, **M.-H. Li**, and S.-S. Li, "A CMOS-MEMS arrayed RGFET oscillator using a band-to-band tunneling bias scheme," in *Proc.*, 28th IEEE Int. Conf. Micro Electro Mech. Syst. (*MEMS'15*), Estoril, Portugal, Jan. 18-22, 2015, pp. 988-991.
- [7] **M.-H. Li**, C.-Y. Chen, C.-H. Chin, C.-S. Li, and S.-S. Li, "Optimizing the close-to-carrier phase noise of monolithic CMOS-MEMS oscillators using bias-dependent nonlinearity," in *IEEE Int. Electron Devices Mtg. (IEDM'14)*, San Francisco, USA, Dec. 15-17, 2014, pp. 22.3.1-22.3.4.
- [8] K.-H. Li, C.-C. Chen, **M.-H. Li**, and S.-S. Li, "A self-sustained nanomechanical thermal-piezoresistive oscillator with ultra-low power consumption," in *IEEE Int. Electron Devices Mtg. (IEDM'14)*, San Francisco, USA, Dec. 15-17, 2014, pp. 22.2.1-22.2.4.
- [9] **M.-H. Li**, C.-Y. Chen, and S.-S. Li, "An experimental investigation on the Q -boosted CMOS-MEMS flexural-mode resonator circuits," *Proc.*, 2014 IEEE Int. Freq. Contr. Symp. (*IFCS'14*), Taipei, Taiwan, May 19-22, 2014, pp. 327-328.
- [10] J. Lee*, C.-S. Li*, Z. Wang, **M.-H. Li**, C.-H. Chin, S.-S. Li, P. X.-L. Feng "High-Frequency Parametric Bulk Mode Resonators in CMOS-MEMS Technology," *Proc.*, IEEE Int. Freq. Contr. Symp. (*IFCS'14*), Taipei, Taiwan, May 19-22, 2014, pp. 329-331. (*Equally Contribution)
- [11] J. Lee*, C.-S. Li*, Z. Wang, **M.-H. Li**, C.-H. Chin, S.-S. Li, P. X.-L. Feng "Multimode Characteristics of High-Frequency CMOS-MEMS Bulk-Mode Resonators," *Proc.*, IEEE Int. Freq. Contr. Symp. (*IFCS'14*), Taipei, Taiwan, May 19-22, 2014, pp. 478-480. (*Equally Contribution)
- [12] C.-Y. Chen, **M.-H. Li**, C.-H. Chin, C.-S. Li, and S.-S. Li, "Combined electrical and mechanical coupling for mode-reconfigurable CMOS-MEMS filters," *Proc.*, 27th IEEE Int. Conf. Micro Electro Mech. Syst. (*MEMS'14*), San Francisco, USA, Jan. 26-30, 2014, pp. 1249-1252.
- [13] **M.-H. Li**, C.-Y. Chen, C.-S. Li, C.-H. Chin, C.-C. Chen, and S.-S. Li, "Foundry-CMOS integrated oscillator circuits based on ultra-low power ovenized CMOS-MEMS resonators," *Tech. Dig.*, IEEE Int. Electron Devices Mtg. (*IEDM'13*), Washington DC, USA, Dec. 9-11, 2013, pp. 18.4.1-18.4.4.
- [14] **M.-H. Li**, C.-Y. Chen, C.-S. Li, C.-H. Chin, and S.-S. Li, "Enhanced temperature sensitivity of a single CMOS-MEMS resonator via resonant modes in orthogonal axes," *Proc.*, 2013 Joint UFFC, EFTF and PFM Symposium (*UFFC'13*), Prague, Czech Republic, July 21-25, 2013, pp.539-542.
- [15] C.-S. Li, **M.-H. Li**, C.-H. Chin, C.-Y. Chen, Philip X.-L. Feng, and S.-S. Li, "A piezoresistive CMOS-MEMS resonator with high Q and low TCF," *Proc.*, 2013 Joint UFFC, EFTF and PFM Symposium (*UFFC'13*), Prague, Czech Republic, July 21-25, 2013, pp. 425-428.
- [16] C.-H. Chin, C.-S. Li, **M.-H. Li**, and S.-S. Li, "A CMOS-MEMS resonant-gate transistor," *Tech. Dig.*, 17th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'13*), Barcelona, Spain, June 16-20, 2013, pp. 2284-2287.
- [17] C.-Y. Chen, **M.-H. Li**, C.-S. Li, and S.-S. Li, "Design and characterization of mechanically-coupled CMOS-MEMS filters," *Tech. Dig.*, 17th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'13*), Barcelona, Spain, June 16-20, 2013, pp. 2288-2291.
- [18] H. Zhu, C.-H. Chuang, C.-S. Li, **M.-H. Li**, J. E.-Y. Lee, and S.-S. Li, "The effects of tight capacitive coupling on phase noise performance: A LAMÉ-mode MEMS oscillator study," *Tech. Dig.*, 17th Int. Conf. on Solid-State Sensors & Actuators

(*Transducers'13*), Barcelona, Spain, June 16-20, 2013, pp. 2304-2307.

- [19] W.-C. Chen, **M.-H. Li**, Y.-C. Liu, D. Weinstein, W. Fang, and S.-S. Li, "Fully differential CMOS-MEMS square-plate oxide resonators with embedded poly-silicon electrodes," *Tech. Dig.*, 17th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'13*), Barcelona, Spain, June 16-20, 2013, pp. 2292-2295.
- [20] **M.-H. Li**, C.-S. Li, C.-H. Chin, C.-Y. Chen and S.-S. Li, "An ultra-low power ovenized CMOS-MEMS resonator monolithically integrated with interface circuits," *Proc.*, 26th IEEE Int. Conf. Micro Electro Mech. Syst. (*MEMS'13*), Taipei, Taiwan, Jan. 20-24, 2013, pp. 753-756.
- [21] **M.-H. Li**, C.-S. Li, L.-J. Hou, Y.-C. Liu and S.-S. Li, "A 1.57mW 99dB Ω CMOS transimpedance amplifier for VHF micromechanical reference oscillators," *Proc.*, 2012 IEEE Int. Symp. on Circuits and Systems (*ISCAS'12*), Seoul, Korea, May 20-23, 2012, pp. 209-212.
- [22] C.-S. Li, **M.-H. Li**, and S.-S. Li, "Differential measurement of piezoresistive transduction for silicon-based MEMS resonators," *Proc.*, 2012 IEEE Int. Freq. Contr. Symp. (*IFCS'12*), Baltimore, MD, USA, May, 2012, 21-24.
- [23] C.-C. Chen, **M.-H. Li**, W.-C. Chen, H.-T. Yu, and S.-S. Li, "Thermally-actuated and piezoresistively-sensed CMOS-MEMS resonator array using differential-mode operation," *Proc.*, 2012 IEEE Int. Freq. Contr. Symp. (*IFCS'12*), Baltimore, MD, May, 2012, 21-24.
- [24] **M.-H. Li**, W.-C. Chen, and S.-S. Li, "CMOS-MEMS transverse-mode square plate resonator with high Q and low motional impedance," *Tech. Dig.*, 16th Int. Conf. on Solid-State Sensors & Actuators (*Transducers'11*), Beijing, China, June 5-9, 2011, pp. 1500-1503.
- [25] **M.-H. Li**, W.-C. Chen, and S.-S. Li, "Mechanically-coupled CMOS-MEMS free-free beam resonator arrays with two-port configuration," *Proc.*, 2011 Joint Conf. of the IEEE Int. Freq. Contr. Symp. – Eur. Freq. Time Forum (*IFCS-EFTF'11*), San Francisco, California, USA, May 1-5, 2011, pp.16-19. (**Best Student Paper Award Winner**)
- [26] W.-C. Chen, **M.-H. Li**, W. Fang, and S.-S. Li, "High- Q integrated CMOS-MEMS resonators with deep-submicron gaps," *Proc.*, IEEE Int. Freq. Contr. Symp. (*IFCS'10*), Newport Beach, California, USA, June 1-4, 2010, pp. 340-343.
- [27] W.-C. Chen, **M.-H. Li**, W. Fang, and S.-S. Li, "Realizing deep-submicron gap spacing for CMOS-MEMS resonators with frequency tuning capability via modulated boundary conditions," *Proc.*, 23rd IEEE Int. Conf. Micro Electro Mech. Syst. (*MEMS'10*), Hong Kong, Jan. 24-28, 2010, pp. 735-738.

DOMESTIC PUBLICATIONS

- [1] **M.-H. Li**, and S.-S. Li, "Temperature Compensated Monolithic CMOS-MEMS Oscillators for Timing Reference and Sensor Applications," 第 18 屆奈米工程暨微系統技術研討會, 台南, Aug. 21-22, 2014. (Oral Presentation) (**Honorable Mention**)
- [2] 陳昭瑜、**李銘晃**、李昇憲, "具備電性與機械耦合技術之模態可重組式 CMOS-MEMS 濾波器," 第 18 屆奈米工程暨微系統技術研討會, 台南, Aug. 21-22, 2014. (Oral Presentation) (**Best Student Paper Award Winner**)
- [3] 陳昭瑜、**李銘晃**、李承勳、李昇憲, "機械耦合式 CMOS-MEMS 濾波器之設計與特性探討," 第 17 屆奈米工程暨微系統技術研討會, 台中, Aug. 22-23, 2013. (Oral Presentation)
- [4] 莊捷旭、李承勳、**李銘晃**、李昇憲, "高 Q 值微機械震盪器研製與探討差動機制對微機械震盪器的影響," 第 17 屆奈米工程暨微系統技術研討會, 台中, Aug. 22-23, 2013. (Oral Presentation)
- [5] 陳文健、**李銘晃**、方維倫、李昇憲, "具次微米間隙之高 Q 值整合式 CMOS-MEMS 共振器," 第 14 屆奈米工程暨微系統技術研討會, 高雄, Sept. 2-3, 2010. (Oral Presentation) (**Honorable Mention**)

RELEVANT COURSEWORK

- **Undergraduate:** Statics, Dynamics, Mechanics of Materials, Thermodynamics, Control Systems, Machine Design, Mechanical Vibrations, Heat Transfer, Electrical Circuits, Microelectronics, Electromagnetics, Signals and Systems, Linear Control Systems, Communication Systems
- **Graduate:** Microsystems Design, RF MEMS Theory and Applications, Microsensors and Signal Conditioning Circuits, Wave Propagation in Elastic Solids, Analog Circuit Design, Advanced Analog Integrated Circuit Design, Phase-Locked-Loop (PLL) and Frequency Synthesizer, Sensing and Actuating Integrated Circuits, Radio Frequency IC Design

LANGUAGES

English – Listening/ Reading/ Speaking/ Writing

Japanese – Reading

Mandarin – Listening/ Reading/ Speaking/ Writing (**Native speaker**)

PROFESSIONAL AFFILIATIONS

Student member, IEEE

2011-Present

REFERENCES

- Professor **Sheng-Shian Li** (ssli@mx.nthu.edu.tw)
Associate Professor, Institute of NEMS, National Tsing Hua University, Hsinchu, Taiwan (**Thesis Advisor**)
- Professor **Chih-Chun Cheng** (imeccc@ccu.edu.tw)
Professor, Department of ME, National Chung Cheng University, Chiayi, Taiwan

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