

# Hei Kam

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## EDUCATION

8/04 - present **Ph.D.** in Electrical Engineering and Computer Sciences, University of California, Berkeley, CA

*Advisor:* Prof. Tsu-Jae King-Liu, Prof. Elad Alon

*Dissertation topic:* "MOSFET Replacement Devices for Energy-Efficient Digital Integrated Circuits."

Expected Graduation Date: August 2009

2004-2005 UC Berkeley GAANN Fellow

*Interests:* Logic devices with steep subthreshold swing. Nanoscale transistors design and optimization. Micro-electro-mechanical systems (MEMS). Processes for low temperature fabrication of MEMS. Nano/micromechanical relay and relay-based circuit design.

1/00-5/04 **B.S.** with High Honor in Electrical Engineering and Computer Sciences, University of California, Berkeley, CA

2002-2004 Ford Motors Company Scholar

## PAST EXPERIENCE

### Research

5/08 - present **Research Assistant** –Department of EECS, University of California, Berkeley  
Developed a methodology to evaluate the energy-delay performance of alternative transistor designs with less than 60mV/dec subthreshold swing (S). Proposed simple guidelines for assessing the true benefits of the MOSFET replacement devices.

1/07 – present **Research Assistant** –Department of EECS, University of California, Berkeley  
Proposed, designed and fabricate nano-electro-mechanical relays for ultra-low-power applications. Developed a low temperature process for NEM relays fabrication. Studied the impact of scaling on the relay performance. Investigated NEM relay-based circuit for ultra-low-energy digital circuits.

1/06 – 12/06 **Research Assistant** –Department of EECS, University of California, Berkeley  
Proposed and designed a MEMS-based nonvolatile memory cell (the nano-electro-mechanical non-volatile memory (NEMory)) for 3D integration with CMOS.

8/04 – 12/05 **Research Assistant** –Department of EECS, University of California, Berkeley  
Developed a 2D simulation tool to study the mechanics and electrostatics of the nano-electro-mechanical field effect transistor (NEMFET). Investigated NEMFET designs with less than 60mV/dec subthreshold swing for ultra-low-power applications at 25 nm gate length.

8/03 – 8/04 **Research Assistant** –Department of EECS, University of California, Berkeley  
Optimized the lateral S/D doping profiles in a FinFET with  $L_{\text{gate}} = 18$  nm via 3D device simulation. Studied the effects of vertical S/D doping profile, S/D contact schemes and parasitic resistance due to non-uniform S/D doping.

## Teaching

- 1/08 – 5/08      **Teaching Assistant** - Department of EECS, University of California, Berkeley  
EE231 – Solid State Devices
- 8/08 – 12/08    **Teaching Assistant** - Department of EECS, University of California, Berkeley  
EE105 – Microelectronic Devices and Circuits

## **PUBLICATIONS**

- S. H. Kim, **H. Kam**, C. Hu and T.-J. King-Liu, “Germanium-Source Tunnel Field Effect Transistors with Record High  $I_{ON}/I_{OFF}$ ”, *accepted for 2009 Symposium on VLSI Technology*
- **H. Kam**, E. Alon, T.-J. King-Liu and M. Horowitz, “Circuit Driven Requirements for CMOS-replacement Devices”, *IEEE Transactions on Electron Devices*, (manuscript in preparation).
- **H. Kam**, E. Alon and T.-J. King-Liu “Energy-Delay Optimization and Generalized Scaling Theory for Relays”, (manuscript in preparation).
- **H. Kam**, E. Alon, T.-J. King-Liu and M. Horowitz, “Circuit Driven Requirements for CMOS-replacement Devices”, *International Electron Devices Meeting Technical Digest*, pp. 427, 2008.
- F. Chen, **H. Kam**, D. Markovic, T.-J. King-Liu, V. Stojanovic, and E. Alon, "Integrated Circuit Design with NEM Relays," *IEEE International Conference on Computer-Aided Design*, Nov. 2008.
- **H. Kam**, T.-J. King-Liu, “Pull-in and Release Voltage adjustment in the Nano-Electro-Mechanical Field Effect Transistor (NEMFET)”, *IEEE Transactions on Electron Devices*, (submitted for review).
- W. Y. Choi, **H. Kam**, J. Lai, D. Lee and T.-J. King-Liu “Compact Nano-Electro-Mechanical Non-Volatile Memory (NEMory) for 3D Integration”, *International Electron Devices Meeting Technical Digest*, pp. 603-606, 2007.
- **H. Kam**, D. Lee, R. T. Howe and T.-J. King-Liu, “A New Nano-Electro-Mechanical Field Effect Transistor (NEMFET) design for ultra-low-power electronics”, *International Electron Devices Meeting Technical Digest*, pp. 463-466, 2005.
- **H. Kam**, L. Chang, and T.-J. King, “Impact of 3D source-drain doping profiles and contact schemes on FinFET performance in the nanoscale regime,” *Proceedings of the 2004 Silicon Nanoelectronics Workshop*, pp. 9-10, 2004.
- C.-H. Lin, J. He, X. Xi, **H. Kam**, A. M. Niknejad, M. Chan, and C. Hu, "The Impact of Scaling on Volume Inversion in Symmetric Double-Gate MOSFETs", *International Device Research Symposium Proceeding*, pp. 148-149, 2003.

## **PATENTS**

- **H. Kam** and T.-J. King-Liu, “Nano-electro-mechanical memory cells and devices,” application published Nov. 2007
- **H. Kam** and T.-J. King-Liu, “Metal-insulator-metal (MIM) switching devices,” application published Nov. 2007