



## CHIM Wai Kin

B.Eng. (1<sup>st</sup> Hons) (NUS), Ph.D. (NUS)

Associate Professor

Department of Electrical and Computer Engineering

National University of Singapore

4 Engineering Drive 3, Singapore 117576

Phone: 6516 6287

E-mail : [elecwk@nus.edu.sg](mailto:elecwk@nus.edu.sg)



### MAJOR RESEARCH INTERESTS

My current research interests can be described as “the investigation of nanostructure fabrication/characterization techniques and the development/application of physical and electrical characterization techniques for the understanding of MOS device physics, reliability and the operation of nanoelectronic memory devices”.

1. Growth and characterization of nanostructures
2. Nanocrystal and SONOS memory devices
3. Scanning capacitance microscopy / spectroscopy
4. Semiconductor/MOS device physics and reliability
5. Quantum mechanical modeling and simulation
6. Photon emission microscopy

### SELECTED RECENT PUBLICATIONS

1. W.K. Choi, W.K. Chim, C.L. Heng, L.W. Teo, V. Ho, V. Ng, D.A. Antoniadis and E.A. Fitzgerald, “Observation of memory effect in germanium nanocrystals embedded in an amorphous silicon oxide matrix of a metal-insulator-semiconductor structure”, *Appl. Phys. Lett.*, vol. 80, no. 11, pp. 2014-2016, 2002.
2. L.W. Teo, W.K. Choi, W.K. Chim, V. Ho, C.H. Moey, M.S. Tay, C.L. Heng, Y. Lei, D.A. Antoniadis and E.A. Fitzgerald “Size control and charge storage mechanism of germanium nanocrystals in a metal-insulator-semiconductor structure”, *Appl. Phys. Lett.*, vol. 81, no. 19, pp. 3639-3641, 2002.
3. W.K. Chim, T.H. Ng, B.H. Koh, W.K. Choi, J.X. Zheng, C.H. Tung and A.Y. Du, “Interfacial and bulk properties of zirconium dioxide as a gate dielectric in metal-insulator-semiconductor structures and current transport mechanisms”, *J. Appl. Phys.*, vol. 93, no. 8, pp. 4788-4793, 2003.
4. W.K. Chim, K.M. Wong, Y.T. Yeow, Y.D. Hong, Y. Lei, L.W. Teo and W.K. Choi, “Monitoring oxide quality using the spread of the dC/dV peak in scanning capacitance microscopy measurements”, *IEEE Electron Device Lett.*, vol. 24, no. 10, pp. 667-670, 2003.
5. E.W.H. Kan, W.K. Choi, W.K. Chim, E.A. Fitzgerald and D.A. Antoniadis, “Origin of charge trapping in germanium nanocrystal embedded SiO<sub>2</sub> system: Role of interfacial traps?”, *J. Appl. Phys.*, vol. 95, no. 6, pp. 3148-3152, 2004.
6. Y.N. Tan, W.K. Chim, B.J. Choi and W.K. Choi, “Over-erase phenomenon in SONOS-type Flash memory and its minimization using a hafnium oxide charge storage layer”, *IEEE Trans. Electron Devices*, vol. 51, no. 7, pp. 1143-1147, 2004.
7. B.H. Koh, E.W.H. Kan, W.K. Chim, W.K. Choi, D.A. Antoniadis and E.A. Fitzgerald, “Traps in germanium nanocrystal memory and effect on charge retention: Modeling and experimental measurements”, *J. Appl. Phys.*, vol. 97, no. 12, article no. 124305, pp. 124305-1 to 124305-9, 2005.
8. Y. Lei and W.K. Chim, “Highly ordered arrays of metal/semiconductor core-shell nanoparticles with tunable nanostructures and photoluminescence”, *Journal of the American Chemical Society*, vol. 127, no. 5, pp. 1487-1492, 2005.
9. J.X. Zheng, G. Ceder, T. Maxisch, W.K. Chim and W.K. Choi, “Native point defects in yttria and relevance to its use as a high-dielectric-constant gate oxide material: a first-principles study”, *Physical Review B*, vol. 73, no. 1, article no. 104101, pp. 104101-1 to 104101-7, 2006.
10. J.X. Zheng, G. Ceder, T. Maxisch, W.K. Chim and W.K. Choi, “First-principles study of native point defects in hafnia and zirconia”, *Physical Review B*, vol. 75, no. 10, article no. 104112, pp. 104112-1 to 104112-7, 2007.
11. K.M. Wong, W.K. Chim, K.W. Ang and Y.C. Yeo, “Spatial distribution of interface trap density in strained channel transistors using the spread of the differential capacitance characteristics in scanning capacitance microscopy measurements”, *Appl. Phys. Lett.*, vol. 90, no. 15, article no. 153507, pp. 153507-1 to 153507-3, 2007.
12. K.M. Wong and W.K. Chim, “Deep-depletion physics-based analytical model for scanning capacitance microscopy carrier profile extraction”, *Appl. Phys. Lett.*, vol. 91, no. 1, article no. 013510, pp. 013510-1 to 013510-3, 2007.
13. K.M. Wong, W.K. Chim, J.Q. Huang and L. Zhu, “Scanning capacitance microscopy detection of charge trapping in free-standing germanium nanodots and the passivation of hole trap sites”, *J. Appl. Phys.*, vol. 103, no. 5, article no. 054505, pp. 054505-1 to 054505-5, 2008.
14. S.Y. Chiam, W.K. Chim, C. Pi, A.C.H. Huan, S.J. Wang, J.S. Pan, S. Turner and J. Zhang, “Band alignment of yttrium oxide on various relaxed and strained semiconductor substrates”, *J. Appl. Phys.*, vol. 103, no. 8, article no. 083702, pp. 083702-1 to 083702-12, 2008.