



香港城市大學  
City University of Hong Kong

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## City University Distinguished Lecture Series

Speaker

**Professor Maciej J. Ogorzalek**

*Professor of Electrical Engineering and Computer Science;  
Head of the Department of Information Technologies,  
Jagiellonian University Krakow, Poland*



# Next microelectronic revolution? Heterogeneous 3D integrated nanosystems and beyond

on

Friday, 24 May 2019 at 4:30 pm

at

Connie Fan Multi-media Conference Room  
4/F Cheng Yick-chi Building  
City University of Hong Kong  
Tat Chee Avenue, Kowloon

### Abstract

Microelectronic circuits are omnipresent. We not only use mobile phones, personal computers but we are surrounded by systems whose operation highly depends on advanced sensors, processing systems, controllers etc. such as home appliances, cars, smart cards, smart energy systems, bio-medical equipment, smart offices, transportation systems and many others.

There are more and more new applications appearing in the picture with enormous data flows to deal with and process for our advantage. For these new envisaged applications, we will need electronic systems with much improved, maybe 1000 times, performance in terms of power consumption, speed of operation and reliability. As the sizing of transistors in current technologies comes to the atomic distance limitations, further development becomes possible by either introduction of new disruptive technologies or changing in geometric arrangements and architectures of the elements and building blocks. Some limitations in microcircuit constructions can be avoided by putting whole building blocks and sub-circuits in stacks. Such an approach allows for more efficient space usage at the same time allowing circuit footprint reduction. New routing solutions offer very significant wire-length reductions thus reducing power dissipations and signal delays. 3D integration looks as a fantastic new area of development, however, there are many new challenges and problems to be solved for the next generation of nano systems. 3D integration offers also unprecedented opportunities by allowing blocks fabricated in heterogeneous technologies to be integrated in one chip. This allows for stacking and integration of microprocessors, memories, RF circuitry, sensors, batteries and hyper-capacitors, energy harvesting blocks, biological and chemical sensors and many new types of building blocks in one chip. However innovation is needed for new developments. In this lecture Professor Ogorzalek will present the state-of-the-art and an outlook with commentaries what new solutions might be needed.

### Biography

Professor Maciej J. Ogorzalek is Professor of Electrical Engineering and Computer Science and Head of the Department of Information Technologies, Jagiellonian University Krakow, Poland. He held many visiting positions in Switzerland, US, Spain, Japan, Germany. Between 2006-2009 he held the Chair of Biosignals and Systems, Hong Kong Polytechnic University under the Distinguished Scholars Scheme.

Professor Ogorzalek has authored or co-authored over 380 papers published in journals and conference proceedings and has written a book *Chaos and Complexity in Nonlinear Electronic Circuits* in 1997. He gave over 60 plenary and keynote lectures at major conferences world-wide. He served as Editor-in-Chief of the IEEE Circuits and Systems Magazine (2004-2007), member of the editorial boards of the IEEE Transactions on Circuits and Systems Part I, Proceedings of the IEEE, International Journal of Bifurcation and Chaos, International Journal of Circuit Theory and Applications also the NOLTA Journal IEICE Japan.

Professor Ogorzalek is IEEE Fellow (1997). He was IEEE 2008 Circuits and Systems Society President. He served as IEEE Division 1 Director, Member of the IEEE Board of Directors (2016-2017). He is Member of the Polish Academy of Sciences (PAN) and Member of the European Academy of Sciences (Academia Europaea).

**Online registration:**

<https://www.cityu.edu.hk/vprt/dls-registration>

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