



**IEEE Nanotechnology Symposium Program
South Auditorium, SUNY Polytechnic Institute**

257 Fuller Rd, Albany NY - 12203
Wednesday, Nov 15th, 2017 (9:00 AM – 6:00 PM)

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Keynote Address (9:15 – 10:00 AM)



Fausto Bernardini

VP and DE, Watson Platform for Health, IBM Research

“Enabling Computational Health in the Era of Big Data”

Abstract

The amount and variety of data in healthcare is growing at a very rapid pace. By some estimates there are 150+ Exabytes of data in healthcare today and doubling every 24 months! In addition to the data, the amount of knowledge in medicine available in the form of publications is doubling every 18 months. The most important challenge organizations are facing is how to cope with the increasing amounts of data and knowledge and how to derive insights that matter in making decisions across the healthcare and life sciences applications. The era of Big Data in healthcare provides opportunities for applying computational methods for gleaning insights regarding effectiveness, practice patterns variations (practice-based evidence), prediction of adverse outcomes, adherence to suggested care regimens, behavior modification, and personalization of care to the individual needs. In this talk, Dr. Bernardini will give an overview of IBM Watson Health, the new business unit in IBM, which aims at providing solutions to healthcare and life sciences applications using cloud, big data technologies and advanced analytics and cognitive approaches.

Keynote Address (1:15 – 2:00 AM)



Daniel C. Edelstein

IBM Fellow, Manager: Processes, Materials, & Integration, IBM Research

Abstract

This year marks the 20th anniversary of IBM's press release and IEDM conference paper announcing the industry's first CMOS/Cu BEOL technology to reach early production. Subsequent manufacturing volume-ramp in mid-1998 provided the first market for CPU chips with Cu BEOL. The salient features of this original technology definition have largely endured to this day, though with steady evolutionary improvements. The process features included Cu dual damascene integration, a TaN/Ta bilayer liner, PVD Cu-seed with electroplated Cu fill, 2-step CMP, a PECVD Si₃N₄ barrier cap with NH₃-plasma preclean, and SiO₂ interlevel dielectric. Architectural features enabled by Cu damascene included multilevel plane-pair hierarchical wire scaling, from low-C/high-density/short-length fine levels to low-R/long-length global levels, and Al-based transitions to wirebond and C4 terminals. With proper integration techniques including these materials and interfaces, we were able to realize Cu's promise of orders of magnitude longer electromigration lifetimes than the Al(0.5%Cu) alloy that it replaced. This has fundamentally kept alive Moore's Law scaling for the BEOL which would otherwise have broken with Al(Cu) long ago. Now in its 10th generation of CMOS manufacturing, and 12th generation in the research phase, we are finally starting to see changes beyond evolutionary in the materials and processes, with the end in sight for Cu fine wires in perhaps 1-2 more generations.

2017 IEEE Nanotechnology Symposium Program

- 8:00-9:00 AM Welcome, Check-in, & Poster setup
- 9:00-9:15 AM Welcome: Prasad Bhosale, Chair & Tom Gow Jr, Director, Albany Nanotech Operations, IBM
- 9:15-10:00 AM Keynote – 1, Enabling Computational Health in the Era of Big Data, Fausto Bernardini, IBM Research
- 10:05-11:05 AM Lightning talks
- 11:00-12:15 PM Public Poster session -judges
- 12:15-1:15 PM Pizza Lunch in Champlain, Suit 3100, 257 Fuller Road, Albany NY-12203
- 1:15-2:00 PM Keynote – 2, 20 Years of Cu BEOL in Manufacturing, and its Future Prospects, Daniel C. Edelstein, IBM Research
- 2:00-3:30 PM Lightning talks
- 3:30-3:45 PM Break
- 3:45-4:30 PM Public Poster session
- 4:30-5:00 PM Awards – Mukesh Khare (IBM), Bahgat G. Sammakia (SUNY), George Gomba (GF)
- 5:00-5:30 PM Recognition awards - 20th Anniversary for Cu interconnects
- 5:30-6:00 PM IBM reception for 20th Anniversary for Cu interconnects

Lightening Talk 1: 10:05 to 11:05 AM

Time	Talk	Session	Poster no.	Authors	Title
10:05-10:10 AM	1	Energy and environmental materials	8	William Chackalis, Mark Altwerger, Iulian Gherasoiu and Harry Efstathiadis	Resilient tandem cell for photoelectrochemical water dissociation
10:10-10:15 AM	2	Energy and environmental materials	20	Graham Potter, Rebecca Zimmerman and James Castracane	Engineering of Mesoporous/Nanoporous Electrodes for Electrochemical Carbohydrate Sensors: Toward in vivo Environmental Applications
10:15-10:20 AM	3	Energy and environmental materials	52	Michael Engel, Benjamin Wunsch, Rodrigo Neumann, Ronaldo Giro, Peter Bryant, Joshua Smith and Mathias Steiner	Nanoscale Flow Chip Platform for Application in the Oil and Gas Industry
10:20-10:25 AM	1	FEOL	10	Yiping Wang, Jian Shi, Xin Sun and Toh-Ming Lu	Dynamic strain engineering via strongly correlated VO ₂ nanohybrid materials
10:25-10:30 AM	2	FEOL	16	Meenakshi Gupta and Yann Mignot	Gate Skirt Removal for 5 nm Technology and Beyond: Process Engineering at the Atomic Scale
10:30-10:35 AM	3	FEOL	40	Zhenxing Bi, Thamarai Devarajan, Muthumanickam Sankar, Nicolas Loubet, Andrew Greene, Chunwing Yeung, Jingyun Zhang, Hao Tang, Liam Young, Lijuan Zou, Veeraraghavan Basker and Nicole Saulnier	Highly Selective Isotropic Chemical Etch Techniques for Advanced Semiconductor Technology
10:35-10:40 AM	4	FEOL	44	M. Sky Driver, Jeffry Kelber and John D. Beatty	Growth of Multilayer Thin Films of Boron Nitride by Atomic Layer Epitaxy
10:40-10:45 AM	1	MOL	11	Erik Milosevic and Daniel Gall	Resistivity Size Effect in Epitaxial Ru(0001) Layers
10:45-10:50 AM	2	MOL	48	Farid Uddin Ahmed, Zarin Tasnim Sandhie, Munem Hossain and Masud H. Chowdhury	Alternative Semiconductor Middle of Line Materials for Improving Sub Nano-meter Device Contact Resistance
10:50-10:55 AM	3	MOL	51	Stan Tsai, Hari Amanapu, Ruilong Xie, Susan Fan, Samuel Choi, Victor Chan, Richard Conti, Xingzhao Shi, Ja-Hyung Han and Dinesh Koli	Selectivity in Self-Aligned Contact (SAC) CMP

Lightening Talks 2: 2:00 to 3:30 PM

Time	Talk	Session	Poster no.	Authors	Title
2:00-2:05 PM	1	Metrology & Yield	12	Bianzhu Fu, Michael Gribelyuk, Frieder Baumann and Yun-Yu Wang	Accuracy improvement in Nanobeam Diffraction Strain Measurements in semiconductor devices
2:05-2:10 PM	2	Metrology & Yield	19	Zhigang Song, Laura Safran and Jinghong Li	Failure Analysis for SRAM Block Failures
2:10-2:15 PM	3	Metrology & Yield	33	Jessica Gruss-Gifford, John Grassucci, David O'Meara, Josh Prendergast, Kyle Dwyer, Paul Higgins, Thomas Haigh, Paul Hall and Jean Wynne	Method of problem solving to diagnose high particle failures due to unique rotation stopping position
2:15-2:20 PM	4	Metrology & Yield	34	Martin Frank, Eduard Cartier, Takashi Ando, John Rozen, Marinus Hopstaken, Elisabeth Levrau, Wei Wang and Vijay Narayanan	Deuterium passivation of TiN/HfO ₂ /Al ₂ O ₃ /InGaAs gate stacks: Pressure and temperature dependence
2:20-2:25 PM	5	Metrology & Yield	46	Viorel Ontalus	When big data is not big enough: Applied Analytics in a real manufacturing environment
2:25-2:30 PM	1	BEOL	14	Oscar Restrepo, Dhruv Singh, Eduardo Silva and Murali Kota	First-Principles Determination of Interconnect Thermal Resistance in Emerging Semiconductor Technologies
2:30-2:35 PM	2	BEOL	36	Uma Sharma, Son Ngyuen, Thomas Haigh, Yiping Yao, Stephen Cohen and Donald Canaperi	Plasma deposited silicon-rich SiN _x film at sub-300°C for Nano-devices encapsulation
2:35-2:40 PM	3	BEOL	45	Niaz Mahmud and Lloyd J. R.	1/f Noise in a low-k dielectric
2:40-2:45 PM	4	BEOL	47	Kevin Musick and Kathleen Dunn	Resistivity and Microstructure of ELD Cobalt for BEOL Interconnects
2:45-2:50 PM	5	BEOL	49	Vijaya Rana, Jay Mody, Brian O'Hara and Jeffrey Riendeau	Adhesion Analysis of Thin Films
2:50-2:55 PM	1	Nanomaterials	5	Jianshi Tang, Luca Nela, Qing Cao, George Tulevski, Keith Jenkins, Damon Farmer and Shu-Jen Han	High-Performance Flexible Electronics and Sensors Enabled by Carbon Nanotubes
2:55-3:00 PM	2	Nanomaterials	6	Baiwei Wang and Daniel Gall	Epitaxial Ti _{1-x} Mg _x N (001) layers: Electrical resistivity and optical properties
3:00-3:05 PM	3	Nanomaterials	23	Mary Mcgahay and Daniel Gall	Thickness-dependent electrical resistivity in epitaxial CrN(001) films
3:05-3:10 PM	4	Nanomaterials	37	Atul Rawal, Kristen L. Riehardt and Ram V. Mohan	Collagen Based Bio-Materials – A Molecular Dynamics Investigation

Poster sessions: 11:00-12:15 PM and 3:45 to 4:30 PM

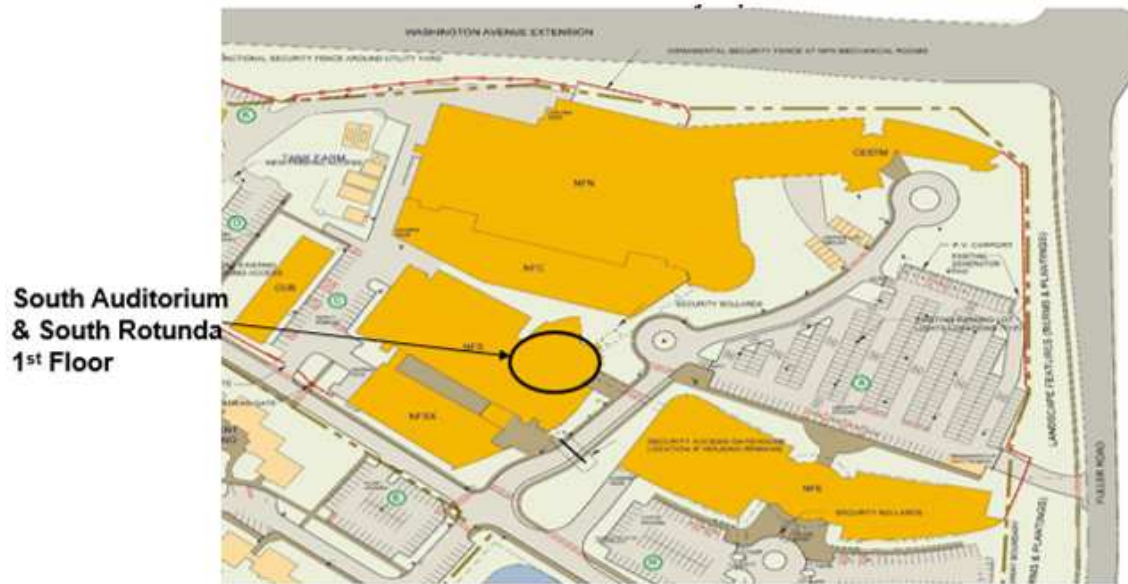
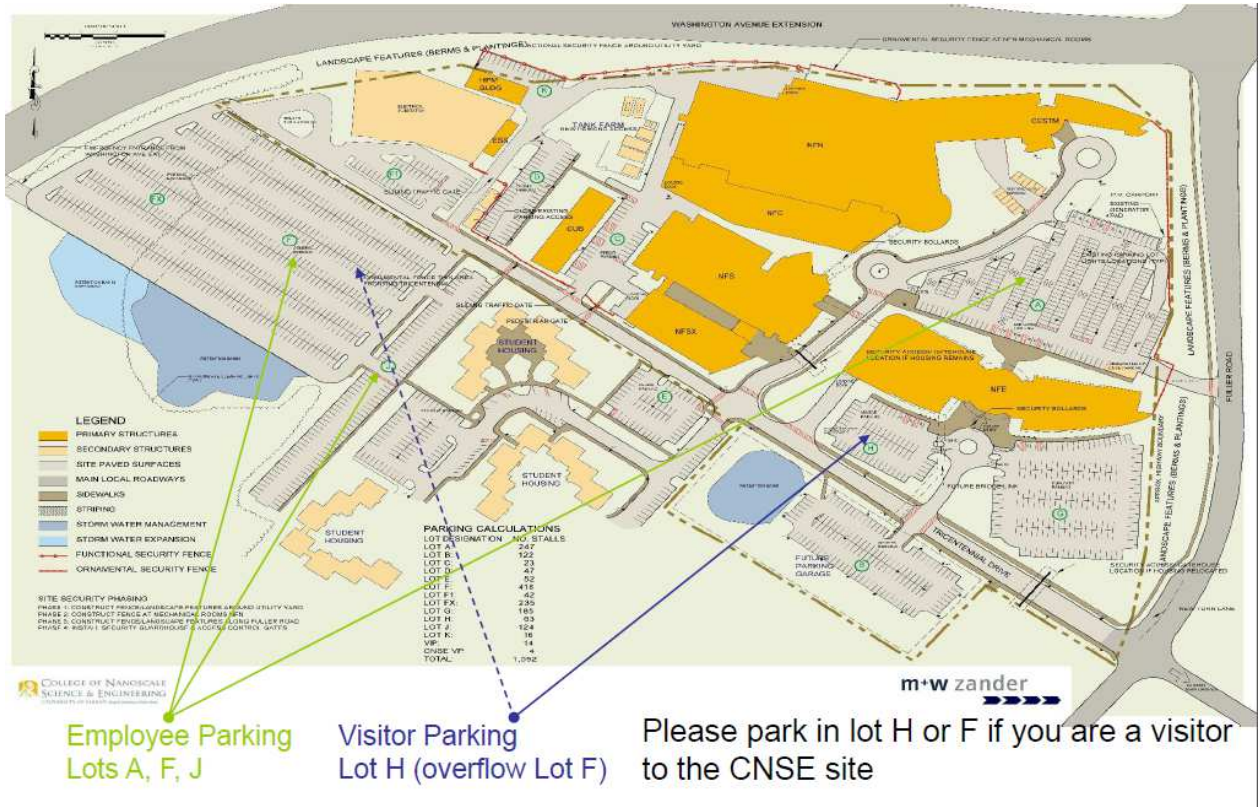
Poster No.	Title	Authors
1	Magnetism in Co-doped AIAs for Spintronic Applications	Viviana Dovale-Farelo, William López-Pérez, Alvaro González-García and Rafael González-Hernández
2	CMOS/Memristor Implementation of Cellular-Automata Based Reservoir Computing	Wilkie Olin-Ammentorp, Karsten Beckmann and Nathaniel Cady
3	Forecast of Sensitivity Performance of Multi-Electron Beam Critical Dimension Metrology by Image Simulation and Analysis	Maseeh Mukhtar and Brad Thiel
4	Synthesis and Characterization of Porphyrin-DNA Constructs for the Self-Assembly of Modular Energy Transfer Arrays	Nathaniel Anderson, Xing Wang and Peter Dinolfo
5	High-Performance Flexible Electronics and Sensors Enabled by Carbon Nanotubes	Jianshi Tang, Luca Nela, Qing Cao, George Tulevski, Keith Jenkins, Damon Farmer and Shu-Jen Han
6	Epitaxial Ti _{1-x} Mg _x N (001) layers: Electrical resistivity and optical properties	Baiwei Wang and Daniel Gall
8	Resilient tandem cell for photoelectrochemical water dissociation	William Chackalis, Mark Altwerger, Iulian Gherasoiu and Harry Efstathiadis
9	Field enhanced Near infrared reflectors	Mark Altwerger, Iulian Gherasoiu and Harry Efstathiadis
10	Dynamic strain engineering via strongly correlated VO ₂ nanohybrid materials	Yiping Wang, Jian Shi, Xin Sun and Toh-Ming Lu
11	Resistivity Size Effect in Epitaxial Ru (0001) Layers	Erik Milosevic and Daniel Gall
12	Accuracy improvement in Nanobeam Diffraction Strain Measurements in semiconductor devices	Bianzhu Fu, Michael Gribelyuk, Frieder Baumann and Yun-Yu Wang
13	The Paradigm Shift of CMP from Planarization to Surface Cleaning Technology	Hong Jin Kim
14	First-Principles Determination of Interconnect Thermal Resistance in Emerging Semiconductor Technologies	Oscar Restrepo, Dhruv Singh, Eduardo Silva and Murali Kota
15	Systematic Analysis of Aluminum Doped Zinc Oxide Thin Films	Jesse Claypoole, Spencer Flottman and Harry Efstathiadis
16	Gate Skirt Removal for 5 nm Technology and Beyond: Process Engineering at the Atomic Scale	Meenakshi Gupta and Yann Mignot
17	Enhance on-Product Process Control by Integrated Overlay and Focus Measurement	Chris Hsu, Young Ki Kim and Yen-Jen Chen
18	Novel synthesis route for MgB ₂ -based superconductors	Ekaterine Sanaia, Guram Bokuchava and Harry Efstathiadis

Poster No.	Title	Authors
19	Failure Analysis for SRAM Block Failures	Zhigang Song, Laura Safran and Jinghong Li
20	Engineering of Mesoporous/Nanoporous Electrodes for Electrochemical Carbohydrate Sensors: Toward in vivo Environmental Applications	Graham Potter, Rebecca Zimmerman and James Castracane
22	Visualizing the Nanoscale Electrostatics of Metal/Si Interfaces with BEEM	Westly Nolting, Steven Gassner, Joshua Goldberg, Chris Durcan, Dan Pennock, Jack Rogers and Vincent Labella
23	Thickness-dependent electrical resistivity in epitaxial CrN(001) films	Mary Mcgahay and Daniel Gall
24	Nanoscale Visualization of Metal/Oxide/Si Interface Electrostatics with BEEM	Jack Rogers, Dan Pennock, Westly Nolting, Steven Gassner and Vincent Labella
25	XPS Investigation of the Oxidation State of Cerium Particles in CMP Slurry	Christopher Netzband and Kathleen Dunn
26	Material behaviors of ultrathin self-aligned silicon-carbide nanowire array doped with Erbium towards quantum applications	Natasha Tabassum, Vasileios Nikas, Brian Ford, Edward Crawford and Spyros Gallis
27	Sophorolipids as biobased materials for organic photovoltaics	Shekar Mekala, Kyle Peters, Kenneth Singer and Richard Gross
28	Can Cobalt be a solution for CMOS Middle of the Line (MOL) Contact Material for Future Sub Nanoscale Technology?	Muhammad Ullah, Munem Hossain, Amimul Ehsan, Mahbube Siddiki and Masud Chowdhury
29	Diamond Probe Applications for Nanoprobng	Sweta Pendyala, Andrew Dalton, Sean Zumwalt and John Miller
30	Offline Probe Card Dual Clean – A Study	Kok Hin Teo and Amy Kraus
31	Cleanroom Gloves Characterization – A Study	Kok Hin Teo
32	Algorithm for Critical Hotspots prediction using the Design-Process interaction technique for EBI	Shweta Vasant Khokale
33	Method of problem solving to diagnose high particle failures due to unique rotation stopping position	Jessica Gruss-Gifford, John Grassucci, David O'Meara, Josh Prendergast, Kyle Dwyer, Paul Higgins, Thomas Haigh, Paul Hall and Jean Wynne
34	Deuterium passivation of TiN/HfO ₂ /Al ₂ O ₃ /InGaAs gate stacks: Pressure and temperature dependence	Martin Frank, Eduard Cartier, Takashi Ando, John Rozen, Marinus Hopstaken, Elisabeth Levrau, Wei Wang and Vijay Narayanan
35	Characterization of NBTI CVS to VRS Correlation on FinFET Technology	Melanie Laberge, Zakariae Chbili, Andreas Kerber and James Lloyd

Poster No.	Title	Authors
36	Plasma deposited silicon-rich SiNx film at sub-300°C for Nano-devices encapsulation	Uma Sharma, Son Ngyuen, Thomas Haigh, Yiping Yao, Stephen Cohen and Donald Canaperi
37	Collagen Based Bio-Materials – A Molecular Dynamics Investigation	Atul Rawal, Kristen L. Rhiehardt and Ram V. Mohan
38	Patterning Scheme Development for enabling PFET RhoC Reduction	Rebecca Martin
39	High Order Interfield Modulated CPE to Compensate Scanner Sombbrero Effect on Overlay	Haiyong Gao, Woong Jae Chung, Nyan Aung, Brett Clinton, Nathan Neal, Phillip Tatti, Wenle Gao, Pavan Samudrala, Yue Zhou, Deneil Park, Juan-Manuel Gomez, Lipkong Yap and Miguel Garcia-Medina
40	Highly Selective Isotropic Chemical Etch Techniques for Advanced Semiconductor Technology	Zhenxing Bi, Thamarai Devarajan, Muthumanickam Sankar, Nicolas Loubet, Andrew Greene, Chunwing Yeung, Jingyun Zhang, Hao Tang, Liam Young, Lijuan Zou, Veeraraghavan Basker and Nicole Saulnier
41	Tunable photonic filter based on resonant grating structure and on-chip microheater	Ritesh Ray Chaudhuri, Amarachukwu Enemuo, Youngsik Song and Sang-Woo Seo
42	Patterning of Indium Tin Oxide with Zinc Micro-particles in Porous Silicon	Amarachukwu Enemuo, Hojjat Rostrami Azmand and Sang-Woo Seo
43	Non Destructive Surface Ultrathin Film Depth Profiles from Angle Resolved Xray Photoelectron Spectroscopy Using Maximum Entropy Method	Yibin Zhang, Bianzhu Fu and Jeffery Riendeau
44	Growth of Multilayer Thin Films of Boron Nitride by Atomic Layer Epitaxy	M. Sky Driver, Jeffry Kelber and John D. Beatty
45	1/f Noise in a low-k dielectric	Niaz Mahmud and Lloyd J. R.
46	When big data is not big enough: Applied Analytics in a real manufacturing environment	Viorel Ontalus
47	Resistivity and Microstructure of ELD Cobalt for BEOL Interconnects	Kevin Musick and Kathleen Dunn
48	Alternative Semiconductor Middle of Line Materials for Improving Sub Nano-meter Device Contact Resistance	Farid Uddin Ahmed, Zarin Tasnim Sandhie, Munem Hossain and Masud H. Chowdhury
49	Adhesion Analysis of Thin Films	Vijaya Rana, Jay Mody, Brian O'Hara and Jeffrey Riendeau
50	A review of well imaging techniques	Gregory Johnson and Jochonia Nxumalo
51	Selectivity in Self-Aligned Contact (SAC) CMP	Stan Tsai, Hari Amanapu, Ruilong Xie, Susan Fan, Samuel Choi, Victor Chan, Richard Conti, Xingzhao Shi, Ja-Hyung Han and Dinesh Koli

Poster No.	Title	Authors
52	Nanoscale Flow Chip Platform for Application in the Oil and Gas Industry	Michael Engel, Benjamin Wunsch, Rodrigo Neumann, Ronaldo Giro, Peter Bryant, Joshua Smith and Mathias Steiner
53	Gas Cluster Ion Beam Processing for Improved Self Aligned Contact Yield at 7 nm Node FinFET	Su Chen Fan, Sean Teehan, Stan Tsai, Kisup Chung, Alex Varghese, Mark Lenhardt, Pietro Montanini, Ruilong Xie, Spyridon Skordas, Bala Haran
54	Inkjet Printed Nanocrystalline Inorganic Perovskite Films: the Novel Solar Cells	Benjamin Swanson, Ian Evans, Andrew J. Yost, F. Guzman, M. Shekhirev, N. Benker, T. Komesu, S. Sikich, A. Enders, P. Dowben, A. Sinitskii, and Carolina C. Ilie

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Please check-in directly at South Auditorium for the event.