

**Katherina Babich**

SMTS at GLOBALFOUNDRIES

Nanotechnology

<http://www.directoryinventor.com/profile/view/6yVQOC0J>**Experience**

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**SMTS****GLOBALFOUNDRIES**Semiconductors  
2010 - Present

FEOL Process Integration at Alliance Technology Development Lead for 14nm bulk FINFET Process Development Previously 22/20nm Process integration of Metal Gate High-k CMOS (Gate-First and Gate-Last) for Bulk and SOI

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**Senior Engineer Scientist****IBM**Public Company; Information Technology and Services  
2007 - 2009

Process Integration for 22nm FINFET and High-K Metal Gate Devices: Led and enabled raised source and drain (RSD) module development work to support critical 22nm and beyond device programs Developed robust low temperature selective Si Epi growth process for 22nm multi-gate nonplanar devices FINFET and Tri-gate devices. Implemented a multi-step pre-clean/growth sequence to enable simultaneous Si growth on heavily doped complementary surfaces. Demonstrated equivalent Epi growth for NFET and PFET regions for HKMG FINFET devices Demonstrated selective Si epi growth on 2nm thick SOI substrate Build and delivered to test a number of fully functional high-k/metal gate integrated device lots Developed a resist shrink process for non-self-aligned high-k/metal gate process flow which helped to study oxygen diffusion and re-growth of interfacial layer in the gate stack Provided support to the development of HfSiO(N) high-K dielectrics by using variable angle spectroscopic ellipsometry down to 130nm region. Developed ellipsometric model which allows extraction the extraction of Si at.% in HfSiO films in agreement with elemental analysis Systematically evaluated process parameter space for non-selective and selective Si:C epitaxy. Identified desirable growth regimes to achieve high carbon substituanality in Si:C material Novel Post-CMOS Device Integration: Fabricated top and bottom gated FET devices using exfoliated graphene process Generated IP covering novel graphene/high-K device structures Established integration route and drove module development to study carbon nanotubes as interconnects for next-generation devices Enabled nanotube growth over metal silicide surfaces. Developed a novel process to enable selective nanotube growth inside the vias

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**Advisory Engineer****IBM**

Public Company; Information Technology and Services

2001 - 2007

Thin Film Optical Characterization and Analysis Extensive hands-on experience with variable angle spectroscopic ellipsometry (VASE) measurements and modeling as well as material characterization using reflectometry, UV and FTIR spectroscopy, atomic force microscopy (AFM) and scanning electron microscopy (SEM) Served as thin film optical characterization and analysis expert. Provided metrology expertise to different divisions within IBM and alliance partners which allowed analysis of new device and substrate materials such as highly strained SiGe alloys, strained Ge, Carbon doped Si, novel salicides, k-high dielectric such as HfO<sub>2</sub>, HfSiO, HfSiON, various resists and ARC materials Trained technical personnel on advanced metrology equipment, metrology test vehicles and production measurements for FEOL, MOL and BEOL process integration. Materials and Processes for high NA 248 and 193nm lithography Developed novel PECVD deposited Si and Ge based antireflective coating (ARC) with built-in hardmask properties. Demonstrated a graded ARC concept which provides exceptional reflectivity control for high NA lithography Achieved the best reflectivity control in the industry affording ~10x reduction in reflectivity compared to other commercial spin-on and CVD ARCs

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## Staff Engineer

IBM

Public Company; Information Technology and Services  
1995 - 2001

Thin film imaging and APSM process developmet Invented proprietary set of materials to be used as underlayer for 248nm bilayer resist system First in industry implemented a 248nm bilayer resist process into volume CMOS 7SF manufacturing which resulted in better CD control, 3X improved process window, and significant improvement in functional yields Developed a number of attenuated phase-shift mask (APSM) materials such as amorphous diamond-like carbon, MoSiON, NiSiON with wide range of transmission suitable for 248 and 193nm lithography Investigated the effects of excimer laser irradiation on optical properties of APSM materials

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## Research Engineer

Bell Labs Lucent Technologies

10,001+ employees; Public Company; Telecommunications  
1993 - 1995

Deposition Process: Development of sputtering deposition process of thin Metal/Metal oxide films used for x-ray mask fabrication. In-situ investigation of mechanical behavior of thin W/PolySi and W/SiN microstructures during processing. Membrane Characterization: Evaluation of optical and mechanical properties of polySi, SiN and SiC membrane materials, Membrane surface quality and radiation stability Evaluation of point source x ray lithography: Critical Dimension (CD) measurements and data collection by top-down SEM analysis. CD analysis and evaluation of linewidth control across exposure field, wafer, and wafer to wafer X ray mask fabrication technology transfer: Coordination and support of x ray mask fabrication efforts. Preparation of technical reports and presentation materials for DARPA and consortium member companies

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## Research Engineer

Bell Labs

Nanotechnology  
1993 - 1995



## **Process of making a lithographic structure using antireflective materials (2 worldwide citation)**

Marie Angelopoulos, Katherina E Babich, Sean D Burns, Allen H Gabor, Scott D Halle, Arpan P Mahorowala, Dirk Pfeiffer  
October 23, 2012: 08293454

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## **Method to Improve Nucleation of Materials on Graphene and Carbon Nanotubes**

Katherina Babich, Alessandro Callegari, Zhihong Chen, Edward Kiewra, Yanning Sun  
September 20, 2012: 20120235119-A1

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## **Filling Narrow Openings Using Ion Beam Etch**

Katherina E Babich, Alessandro C Callegari, Christopher D Sheraw, Eugene J O Sullivan  
August 30, 2012: 20120217590-A1

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## **Low-temperature absorber film and method of fabrication**

Katherina E Babich, Pratik P Joshi, Kam Leung Lee, Deborah A Neumayer, Spyridon Skordas  
October 20, 2011: 20110254138-A1

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## **Mask forming and implanting methods using implant stopping layer**

Katherina Babich, Todd C Bailey, Richard A Conti, Ryan P Deschner  
August 16, 2011: 07998871

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