

DR AJAY J SINGHAL

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SUMMARY

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Twenty years of research experience in Materials Science, Nanotechnology Industry, with an interest in Life Science & Health Care Technologies, and academia. Interested in research and teaching in Materials Science, Nanotechnology, in Medical Applications. Deep interest in commercializing innovation for Healthcare.

- As founder and Chief Scientist, xGENETICS, Inc. inventor on patents on “Early Detection of Cancer” 7 provisional and 1 non-provisional PCT (PCT/US2007/US 89096) and US patent applications (US Patent Application 11/966,702) filed, approved for world-wide filing (2006-2009).
- Based on Doctorate research in Nanotechnology, electron-beam Digital Imaging, Image Analysis, Image Processing, and Statistical Analysis, submitted Small Business Innovation Research (SBIR) proposal for Early Detection , Imaging and Image Analysis of Cancer Cells, and to advance methods pioneered by Johnson & Johnson, USA, to National Cancer Institute, USA, in collaboration with Radiation Oncologist, Dr Geraldine Jacobson. (2007).
- Worked with IMTECH, Chandigarh, for biomarker research and with Medical Device Company, RMS India, Chandigarh, for Indo-US collaboration, as well as commercialization of their X-Ray, EEG, and other Medical Technologies. (2009).
- Visited and interacted with various Clinicians, Researchers, and Directors of Research in the field of Biomedical Imaging, Radiation Oncology, Medical Oncology and Surgical Oncology in USA: Stanford Cancer Center, Mayo Clinic, UChicago Hospitals, and School of Medicine, in India: Dr Lalpath Labs, Apollo Hospitals, AIIMS, PGI, Chandigarh, Tata Memorial, Prince Aly Khan Hospital, Hinduja, Ruby Hall Clinic, Jehangir Hospital, Bharati Vidyapeeth University Medical School and Hospital. (2006-2011).
- Visited Japan (with Medical Device Company DVx Inc.), Singapore, UK, especially to further improve Medical Device & Engineering Methodology for above patented methods. (2007).
- Visited and interacted for funding and marketing above inventions with numerous Medical Diagnostic and Device Companies in US, Europe and Asia: Johnson & Johnson, Quest Diagnostics, Roche, Becton Dickinson, Siemens Oncology, Affymetrix, Abbott, DVx, RMS India Pvt Ltd. as well as with pharmaceutical Companies in US, and Europe: Eli Lilly, Merck, Novartis, Astra Geneca.(2006-2009).
- Presented Healthcare and Medical Innovation proposal to over 90 Corporate Groups, Hospitals, Medical Device, Pharma Companies, and Venture Capital Groups. (2006-2009).
- Consulted with Health Highway, a US-based firm for EMR (Electronic Medical Record) & TeleMedicine product offerings for the US Hospitals & Clinics as well as for integrating global health-care solutions. (2008-2009).
- Deep knowledge and experience in radiations, and radiation physics: electron-beam, X-ray, neutron, positron, carried out detailed mathematical analysis of radioactive decay of materials used in Radiation Oncology and sensitive and accurate detection of: alpha, beta and gamma radiations (2003).
- Deep knowledge of cobalt, nickel, titanium based materials and their alloys, as well as well other polymeric materials, vital in Healthcare. (1986-Present).
- Good relations with the Universities in the US, Europe, and Asia for International Collaborations.
- US Citizen.

Skilled in presenting to the Venture Capital investment groups, in interpersonal, customer communication, oral and written presentation, financial analysis, business strategy and marketing.

Skills:

Technical: Nanotechnology, Materials Science, Thin Films, Manufacturability, Medical Applications, Industrial, Technology & Project Management, Analytical, Innovation, Intellectual Property

Soft: Compassionate, communicative, detail-oriented, collaborative, a bridge between businesses, goal-oriented, success-driven, outstanding team player, go getter, motivated.

EXPERIENCE

- **NUTAN INSTITUTE OF ENGINEERING & TECHNOLOGY, Talegaon, Pune** 12/2011-present
Professor, Mechanical Engineering & Head, Training, Placement & Research: Taught (i) Industrial Management & Organization & (ii) Basics of Mechanical Engineering
- **CONSULTANT IN TEACHING** 11/2011-12/2011
Developed innovative methods for teaching Mathematics to X, XI, XII grade students
- **THERMAX LTD, PUNE, INDIA** 06/2010- 8/2011
Head, Intellectual Property and Innovation (SRUSHTI365)
Steered Innovation efforts (SRUSHTI365) across all business divisions Pan Thermax. Collaboration on materials coating technologies with companies and research laboratories in USA. Consulted internally on Solar Photovoltaic materials. Consulted for setting up Nanotechnology and Materials Research Laboratory in Chennai for collaboration with International Research Institutes .
- **UNIVERSITY OF PETROLEUM & ENERGY STUDIES, Dehradun, India** 01/2010- 06/2010
Vice President, Research & Dev
Responsible for architecting research & development, and intellectual property framework for the University, internally for the three Colleges- Engineering, Management & Law.
- **xGENETICS, INC., USA** 09/2006- 2009
Founder & CEO
Founded xGenetics, Inc., a chip-based device firm. Invented and filed 1 US, 1 worldwide and 7 US provisional patent. Responsible for researching R & D collaborations and business development in North America, Europe and Asia, for (i) Clinical Trials (ii) Bio-markers for Cancer (iii) & Bio-Sensor Instrumentation and kit development

Consulted with Health Highway, a US-based firm for EMR (Electronic Medical Record) & *TeleMedicine* product offerings for the US Hospitals & Clinics as well as for integrating global health-care solutions.

Consulted on Nanotechnology for Institute of Defense Studies and Analyses

Consulted for UK-based **Cosmos Ignite** and India-based **Solaryan Technologies**

Investigated technology and cost for LED-based, portable solar-powered lighting solutions for the UK-based Cosmos Ignite. Assisted on making products accessible, for the Bottom of Pyramid (BOP) segment with a view to reach NGOs in India and overseas. Assisted in raw-material cost-issues for poly-silicon-based Solaryan Technologies.

Guided a 6-month long Core Strategy, for University of Chicago's Global Initiatives effort, focused on India. Created names such as "**Taxila of the West**" and provided strategic input, qualitative and quantitative, for serving key social and market segments- Education, Health and Hospitality, Infrastructure and Entertainment.

ADVANCED MICRO DEVICES, Sunnyvale, CA, USA 2005 – 08/2006

Business Development and Semiconductor Process Development

Strategic Marketing and Technology Development

- At Spansion, researched alliance map in storage industry. Recommended strategic alliances to Spansion executive management.
 - Carried out company and competitive analysis of flash memory semiconductor and disk drive companies.

- Analyzed technology and operational strategy of North American, Japanese and Chinese firms.
- At Spansion, completed 6-month long industry, company, and competitive study for semiconductor memory. Researched and analyzed financials, news and reports. Proposed business strategy to executive management. New business unit created.
 - Compared benefits and barriers to entry for Solid-State Drive (SSD).
 - Recommended opportunities for flash-memory (NOR and NAND) drive in consumer electronics (CE), mobile and computing applications.
- Invented and filed 1 patent *worldwide* on IC design manufacturability for flash memory and microprocessor designs.
 - Created automated lithographic process simulation methods.
 - Detected yield-sensitive features in full-chip IC designs 65-nm, 90-nm and 130-nm technology nodes.
 - Simulated lithographic process for 45-nm technology node.
 - Created best-practices for robust mask manufacturing and metrology for 65-nm, 90-nm and 130-nm nodes.
- Collaborated with semiconductor design manufacturability software start-ups to benefit logic and flash technologies.

MENTOR GRAPHICS, San Jose, CA, USA

2003 – 2005

Advisor on Semiconductor Design Manufacturability

Senior Customer Technical Advisor

- Created *new* market in EDA software for VLSI design manufacturability.
 - Advised sales, marketing and engineering senior management on technical improvements.
 - Recommended *key* market requirements and customer specifications.
- Grew revenue 30% by \$60M, of new products in a single year.
- Developed and mentored customer on innovative lithographic, DFM and OPC simulation methods.
- Enabled leading north-American foundry (IBM), partner companies and many IC customers, on manufacturability of communication, graphics and microprocessor designs for 65-nm, 90-nm and 130-nm nodes.

MOTOROLA, Austin, TX, USA

2000 – 2003

Semiconductor Process Technology Development

Core Team Leader

- Managed cross-functional team of 15. Developed 90-nm CMOS platform process and device integration, in collaboration with AMD. Collaborated with circuit design, process engineering, test and yield engineering communities.
 - Integrated advanced lithographic, low-*k* dielectric and copper processes. Designed device test structures.
 - Improved SRAM device electrical yield 40-fold.
 - Patented novel methods to fabricate ultra-small semiconductor device structures.
 - Published articles on Device Technology and Interconnect Technology, in international conferences sponsored by IEEE.
- Collaborated with cross-continent engineering teams for 65-nm and 90-nm technology development and transfer. Transferred 200mm technology for 300mm manufacturing in 4-way joint venture: Motorola, ST Microelectronics, Philips and TSMC.

APPLIED MATERIALS, Santa Clara, CA, USA

1996 – 2000

Semiconductor Process Development

- Technical advisor to senior management on strategic lithography project.

- Invented and filed 4 patents on methods for thin film silicide processes and rapid thermal processing for transistor technology.
- Established Applied Materials as the “Preferred Technology” with device manufacturers and foundries worldwide.
- Displaced competition and helped gain \$130M excess business in silicide, ultrashallow junction and copper processes.
- Won *Best Paper Award* on Interconnect Process Technology, American Vacuum Society’s Annual Meeting, CA (1998).

OTHER INTERESTS

- Created and presented many music programs, “Shruti-The Music of India” on community radio.
- Continue to play flute and to practice “Kathak”.
- Lectured at California schools on Education, Science and Technology. Volunteer judge for “Campaign-for-College” for California High Schools. Assisted in AMD-brand enhancement.
- Volunteered for Healthcare of members of Thermax Family: Specifically, near-patient care in two cases of “Upper Respiratory Infection & Thrombosis”, and for “Congenital Heart Disease: Arterial Switch”.
- Volunteered at numerous Thermax CSR (Corporate Social Responsibility) events: “Color My World” an art event for kids, Education and Social events “The Joy of Going to School”, “The Joy of Giving”, for underprivileged communities.
- Played flute as part of a group of Thermax: Swar Sandhya: A Musical Evening in Ramakrishna Sabhagruha
- Poetry and Languages- Hindi, Urdu, English, French, Chinese, Japanese

EDUCATION

UNIVERSITY OF CHICAGO GRADUATE SCHOOL OF BUSINESS

3/2008

Master of Business Administration, in the Executive Program

- University of Chicago is home to **81 Nobel Laureates**, with 55 in Economics, the remaining in Science, Medicine, Physics and Peace. The University’s Nobel laureates are largest anywhere in the world.

UNIVERSITY OF ILLINOIS

Urbana-Champaign, IL

Ph.D. Materials Science and Engineering

1996

- Completed Ph.D. work in Materials Research Laboratory, the laboratory where Dr John Bardeen was credited with **2 Nobel Prizes** in Semiconductor Materials and Superconducting Materials.
- Distinguished Scholar Award, Microbeam Analysis Society in recognition of thesis on Nanotechnology and Materials (1995).
- Published and presented numerous articles in international conferences and journals, including Materials Research Society, American Vacuum Society, SPIE, Electrochemical Society (ECS), Ultramicroscopy, Journal of Physical Chemistry and IEEE.

UNIVERSITY OF TEXAS

Austin, TX

M.S. Materials Science and Engineering

1992

- Published thesis on super-hard, thin-film, Nano-magnetic materials.

NATIONAL INSTITUTE OF TECHNOLOGY

Trichy, India

B.Eng. (Honors) Metallurgical Engineering

1990

- Recipient of National Merit Scholarship and ranked 54 among over 20,000 students, for entrance exam into the school.
- Graduated as *Best Outgoing Student* in class.

PATENTS ISSUED & FILED IN CHIP & NANO-TECHNOLOGY

- (1) A Method for Early Detection of Cancer, world-wide patent application, PCT Application No. PCT/US2007/89096, Publication No. WO 2008/085777 (published July 17, 2008)
- (2) Method of Increasing Manufacturability of a Circuit Layout, worldwide application pending, filed by AMD
- (3) United States Patent No. 6858542, Semiconductor fabrication method for making small features, Issued February 22, 2005
- (4) United States Patent No. 5,985,680, Method and apparatus for transforming a substrate coordinate system into a wafer analysis tool coordinate system, Issued November 16, 1999
- (5) United States Patent Application No. 20020162500, Deposition of tungsten silicide films
- (6) European Patent, EP1099776A1, issued on May 16, 2001
- (7) Japanese Patent, JP2001274111A, issued October 5, 2001

- (8) Method for increasing manufacturability of a circuit layout, US Patent, Application Number 11/437,312
- (9) Design for Manufacturability, United States Patent, Application Number 12/479,675 in process
- (10) A Method for Early Detection of Cancer, US Patent Application 11/966,702 filed December 28, 2007

PUBLICATIONS & PRESENTATIONS

- 1) A. Singhal, **J.F. Stubbins**, B.N. Singh and F.A. Garner, **J. Nucl. Mater.** 212215 (**1994**) 1307.
- 2) A. Singhal, J. M. Gibson and M. M. J. Treacy, Mass Measurement in Sub-Nanometer Clusters by Z-Contrast Microscopy, *Microbeam Analysis Society, Proceedings 29th Annual Conference* Breckenridge, Colorado, ed. by E. S. Etz, (VCH: New York) 277–278 (1995).
- 3) A. Singhal, J. C. Yang and J. M. Gibson, "STEM-based Mass Spectroscopy of Supported Re Clusters", *Ultramicroscopy*, 67 (1997), p.191-206.
- 4) Singhal, J. M. Gibson, M. M. J. Treacy, P. D. Lane and J. R. Shapley, Stability of Supported Organometallic Clusters Probed by a Mass-Sensitive TEM Technique, *J. Phys. Chem.*, **100** 6385–6388 (1996).
- 5) THE RAFT-LIKE STRUCTURE OF SUPPORTED PtRu5. Judith Yang , Steve Bradley, Ajay Singhal, Michael Nashner, Ralph Nuzzo, J. Murray Gibson, Univ. of Illinois at Urbana-Champaign, Materials Research Lab, Urbana, IL; UOP, Des Plaines, IL. **SYMPOSIUM Z**, Recent Advances in Catalytic Materials, Materials Research Society, December 2 - 4, 1997
- 6) Capping layers, cleaning method, and rapid thermal processing, Saigal, Dinesh; Lai, Gigi; Yang, Lisa; Su, Jingang; Ngan, Ken; Narasimhan, Murali K.; Chen, Fusen E.; **Singhal**, Ajay; Lopes, Dave; Lian, Sean; Cao, ... (c) **1999 SPIE**--The International Society for Optical Engineering.
- 7) A. Singhal, T. Sparks, K. Strozewski, S. Parihar, et al.: "Novel Approach to Contact Integration at 90-nm Node and Beyond", 203rd Meeting of Electrochemical Society, ULSI Process Integration-III with IEEE Electron Device Society, Paris, April 27- May 2, 2003, p. 217.
- 8) K.C. Yu, J. Werking, C. Prindle, M. Kiene, M.-F. Ng, B. Wilson, A. Singhal, et al. "Integration Challenges of 0.1um CMOS Cu/Low-k Interconnects", Proceedings of IEEE Interconnect Technology Conference San Francisco, CA, June 2 - 4, 2002
- 9) S. Parihar, M. Angyal, D. Reber, B. Boeck, A. Singhal, et al. "A High Density 0.10um CMOS Technology Using Low K Dielectric and Copper Interconnect," IEEE Tech. Digest of 2001 IEDM, pp.249--252, December 2001

- 10) A. Singhal, P. Dewan, R. Aggarwal, Knowledge Paper, World Renewable Energy Congress, Hotel Le Meridien, New Delhi, March 18-20, 2010
- 11) A. Singhal, presentation and panel discussion on “Patent Litigation in US and in India” 3rd Global Intellectual Property Conference, organized by ITAG Business Solutions, Kolkota, in Bangalore, April 28-30, 2011
- 12) A. Singhal, Invited Speaker, “Intellectual Property Management” at the Confederation of Indian Industry (CII) Intellectual Property Conference, Taj, Hyderabad, India, July 15-16, 2011
- 13) A. Singhal, Application of Innovation to Change Management and Its Psychology (First Draft, In Preparation and Review, April, 2012)
- 14) A Singhal, “Nanotechnology for Therapeutic Monitoring of Patient and Early Diagnosis of Cancer” Accepted for 1st International Conference on Functional Materials for Defence (ICFMD), Defense Institute of Advanced Technology, Girinagar, Pune, May 18-20, 2012
- 15) A Singhal, Invited Talk, College of Engineering Pune, “Semiconductor Materials and Applications: Lighting A Billion Lives to Coloring Your World”, Friday, August 10, 2012