Carlos A. Paz de Araujo

Symetrix Device Sciences and Technology Chair Professor/Associate Dean of Research and Development- University of Colorado, Colorado Springs, and

Executive Chairman, Symetrix Corporation,

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a. Professional Preparation.

University of Notre Dame	B.S.E.E.	1977
University of Notre Dame	M.S.E.E.	1979
University of Notre Dame	PhD.	1982

b. Appointments and Honors.

1982-1986	Assistant Professor –University of Colorado/CS (UCCS)
1987-1989	Associate Professor UCCS
1992 – Present	Full Professor – UCCS
2009 – Present	Chair Professor and Associate Dean of R&D -UCCS
1989 – Present	Executive Chaorman

2006 – Recipient of the IEEE award/medal "Daniel Noble"

2013 – IEEE Fellow

c. Relevant Publications in the CeRAM area.

1. Christopher McWilliams, Carlos Paz De Araujo, Jolanta Celinska, and Kan-Hao Xue, "Device characterization of correlated electron random access memories", *J. Appl. Phys.* **109**, 091608 (2011)

2. Christopher McWilliams, Carlos Paz De Araujo, Jolanta Celinska, and Kan-Hao Xue, "Re-Programmable Antifuse FPGA Utilizing Resistive CERAM Elements", *Integrated Ferroelectrics,* **124**, 97-104 (2011)

3. Jolanta Celinska, Christopher McWilliams, Carlos Paz De Araujo, and Kan-Hao Xue, "Material and Process Optimization of Correlated Electron Random Access Memories (CeRAMs)", J. Appl. Phys. 109, 091603 (2011)

4. Kan-Hao Xue, Carlos Paz De Araujo, Jolanta Celinska, and Christopher McWilliams, "A Non-Filamentary Model for Unipolar Switching Transition Metal Oxide Resistive Random Access Memories", J. Appl. Phys. 109, 091602 (2011)

5. Jolanta Celinska, Christopher McWilliams, Carlos Paz De Araujo, and Kan-Hao Xue, "Operating Current Reduction in Nickel Oxide Correlated Electron Random Access Memories (CeRAMs) through Controlled fabrication Processes", Integrated Ferroelectrics, 124, 105-111 (2011)

d. Synergistic activities.

Developed and commercialized via licensing and co-development, the following Technologies:

1. Materials Design for high endurance FeRAM (FRAM); roughly 200 US awarded patents – (Already reaching 650 Million devices) – standard eCash RFID smart cards (SUICA) (JR-Japan)
2. Device Modeling and process modeling for FeRAM – from physical first principles
3. Developed High k technology of BST for Cell phones, Hearing aids and other applications – fully commercialized (over 700 Million devices)
4. Developed device models for tuning BST capacitors (C/V) for applications in Mobile devices - fully commercialized
5. Applications of FeRAMs for smart meters with energy harvesting – fully commercialized
6. Device Physics of Quantum Transport and filament Free RRAM (CeRAM) with Mott-like phase transitions and dynamic screening
7. Device development and materials optimization of extrinsic Ligands as a doping control technology in Transition Metal Oxides
8. Development and device modeling of Focal Plane infrared detectors using dynamic switching to eliminate "choppers" – entering final development for commercialization in safety and medical Thermography
9. Process sensitive materials/device models in many perovskites and multilayering and functionally graded materials in FeFETs
10. Development of LSMCD and MOCVD sources and deposition systems for oxides
11. Development of precursors and doping scheme for special device applications in microwave regime.

e. Collaborators & other affiliations.

1. **Collaborators**.

Jolanta Celinska (Director of Research at Symetrix Corporation in Colorado Springs)
Dr. Gota Kano – Panasonic/Kochi University (emeritus)
Sandwip Dey (Prof. at Arizona State University)
Dr. Orlando Auciello – Chair Professor, University of Texas, Dallas
Dr. Tatsuo Otsuki -JR

2. Industrial Collaboration

Through Symetrix and the University of Colorado Special Chair conditions, I have made over 25 licensing and collaboration programs and achieved up to 4 Million dollars in SBIRs. Also, the formation of three successful local companies and an overall R&D program of over 60 Million USD in the last 30 years. A sample of industry and government collaborators are – Ramtron Corporation, Panasonic, Delphi, Harris, Hughes Aircraft, Siemens, Sony, Epson, STMicroelectronics, IMEC, Micron, Raytheon, NASA, Hynix and many others.