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Professional Profile

Dr. Chaudhary's multidisciplinary expertise and over 15 years of broad technical experience cross-cuts fields of electrical engineering, optics, materials engineering, and physical sciences. From electrical engineering perspective, he has extensive experience in solar cells, light-emitting diodes and displays, capacitors, memories, transistors, sensors, and circuits.

Dr. Chaudhary's materials background includes organic and inorganic semiconductors, metals, nanomaterials, biomaterials, thin-films, and material interfaces. He specializes in device physics, materials and thin-film processing, device fabrication, improving functional performance, analyzing failures, and understanding process-structure-property-performance relationships across material, component, device, and system levels. His characterization tool skill-set includes a wide range of electrical, optical, microscopic, and spectroscopic techniques.

Prior to joining Exponent, Dr. Chaudhary was Assistant Professor and Associate Professor at Iowa State University, where he was the head of the Nano Architectonics and Organic Electronics Laboratory, and Associate at the US Department of Energy Ames Laboratory. During this period, he developed new materials processing approaches and optical architectures to improve efficiency of thin-film solar cells. His photovoltaic material expertise includes conjugated polymers/molecules, cadmium telluride, perovskite, and silicon material systems. He also made multiple contributions in the area of defect characterization in semiconductor thin-films. His other key works include projects on titania based memory devices, optical and bio(chemical) sensors, organic thin-film transistors, organic light-emitting displays, and photonic components such as waveguides, anti-reflection coatings, transparent electrodes, and plasmonic structures. For characterization purposes, Dr. Chaudhary has extensively utilized a wide range of electrical, optical, microscopic, and spectroscopic techniques. During his doctoral studies, he worked with materials such as organic semiconductors, quantum dots, carbon nanotubes, nanotemplates, and biomolecules on developing functional hybrids and embodiments pertinent to consumer electronics, nanotechnology, and biotechnology.

Dr. Chaudhary has assisted clients in developing metrology solutions for opto-electronic thin-films, investigating performance bottlenecks in solar cells, and characterizing new synthetic materials for consumer electronic device applications. He has also consulted for edtech clients and has over 8 years of experience teaching courses on electric circuits, semiconductor materials and devices, flexible electronics, and energy systems. Dr. Chaudhary has published 50 peer-reviewed research articles in top international journals and presented his work in major international conferences. He has received several awards and honors during his career, including the nationally prestigious US National Science Foundation CAREER Award.

Academic Credentials & Professional Honors

Ph.D., Electrical Engineering, University of California, Riverside, 2006

B.Tech., Electrical Engineering, Indian Institute of Technology, 2001

Languages

Hindi

Patents

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Publications

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Bobbitt J, Weibel S, Elshobaki M, Chaudhary S, Smith E. Fourier transform-plasmon waveguide spectroscopy: A non-destructive multi-frequency method for simultaneously determining polymer thickness and apparent index of refraction. Analytical Chemistry 2014; 86(24):11957-11961.

Elshobaki M, Anderegg J, Chaudhary S. Efficient polymer solar cells fabricated on poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate)-etched old indium tin oxide substrates. ACS Applied Materials & Interfaces 2014; 6(15):12196-12202.

Mahadevapuram RC, Car JA, Chen Y, Bose S, Nalwa KS, Petrich JW, Chaudhary S. Low-boiling-point solvent additives can also enable morphological control in polymer solar cells. Synthetic Metals 2013; 185-186:115-119.

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Mahadevapuram RC, Chen Y, Carr JA, Nalwa KS, Chaudhary S. Uncovering some more realities of solvent-additives in organic solar cells. 2011 Materials Research Society Fall Meeting and Exhibit, Boston, MA, 2011.

Thoeming AL, Carr JA, Mahadevapuram RC, Chaudhary S. Further investigation into the paintbrush deposition technique for P3HT:PCBM based organic solar cells. Materials Research Society Fall Meeting and Exhibit, Boston, MA, 2011.

Chen Y, Mahadevapuram RC, Nalwa KS, Chaudhary S. Revealing the pros-and-cons of different annealing treatments in polymer solar cells. Materials Research Society Fall Meeting and Exhibit, Boston, MA, 2011.

Chaudhary S. Organic photovoltaics: present, and future prospects. Materials Science & Technology Conference and Exhibition, Columbus, OH, 2011.

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Kuang P, Park JM, Leung W, Constant K, Chaudhary S, Ho KM. High aspect ratio nanoscale metallic

structures: a platform for photonic devices. SPIE Optics + Photonics Conference, San Diego, CA, 2011.

Wodo O, Tirthapura S, Chaudhary S, Ganapathysubramanian B. Graph and computational homology concepts to streamline process-structure-property relationships: Application to organic thin film devices. 11th US National Congress on Computational Mechanics, Minneapolis, MN, 2011.

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Wodo O, Tirthapura S, Chaudhary S, Ganapathysubramanian B. Morphology descriptors of bulk heterojunctions in thin film organic solar cells. Materials Research Society Spring Meeting and Exhibit, San Francisco, CA, 2011.

Nalwa KS, Mahadevapuram RC, Chaudhary S. Controlling defect density in polymer-fullerene bulk-heterojunction solar cells by optimizing growth conditions. TMS Annual Meeting & Exhibition, San Diego, CA, 2011.

Mahadevapuram RC, Nalwa KS, Dalal VL, Chaudhary S. Photovoltaics using doped and undoped amorphous silicon heterojunctions with conjugated polymers. TMS Annual Meeting & Exhibition, San Diego, CA, 2011.

Jeffries-El M, Mike M, Nalwa KS, Makowski A, Putnam D, Chaudhary S. Design and synthesis

of new thiophene containing polymers for use in photovoltaic applications. American Chemical

Society 239th National Meeting, San Francisco, CA, 2010.

Chaudhary S. Organic Photovoltaics@Ames. National Renewable Energy Laboratory, Golden, CO, 2010.

Thoeming AL, Nalwa KS, Liu R, Shinar J, Shinar R, Chaudhary S. Single substrate integration of organic light-emitting diode, organic photodetector and sensing element for photoluminescence based bio(chemical) sensors. SPIE Optics+Photonics, San Diego, CA, 2010.

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associated optoelectronic impact of carbon nanotubes in polymer-fullerene solar cells. Tech Horizons Conference, University of California, Riverside, 2007.

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organic-inorganic nanoassemblies. BioMEMS and Biomedical Nanotechnology Conference, Washington, DC 2003.

Chaudhary S, Kim JH, Ozkan M. Diverse applications of quantum-dots from devices to bioimaging. Association for Lab Automation - Small Talk, San Jose, CA, 2003.

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