

APPENDIX C. CMDITR FUNDED PI RESEARCH CAPSULES

Neal Armstrong — University of Arizona



(Chemistry & Optical Sciences) Development and nanometer-scale characterization of new selforganizing molecular assemblies, characterization and chemical modification of interfaces in emerging organic electroluminescent and organic photovoltaic technologies, new chemical sensor platforms based on combinations of electrochemistry, micro-contact printing, polymer thin films, and optical waveguide technologies.

Glenn Bartholomew — University of Washington



(Chemistry) – Rational design of materials with structures and electronic properties conducive for a number of photonic and electronic applications. Current efforts in three areas: 1) sugar-derivatized electronic organic chromophores, 2) chemistry to induce “permanent” charge distributions in organic electronic and/or light emitting devices and 3) new materials and strategies for photovoltaics.

Sue Ann Bidstrup Allen — Georgia Institute of Technology



(Chemical and Biomolecular Engineering) Polymeric systems and processing conditions used in electronic packaging. Development of in-situ sensors and characterization techniques to evaluate properties of thin polymeric films for GHz multichip modules. Exploration of the effect of film anisotropy on moisture diffusion, modulus, coefficient of thermal expansion, and conductivity.

Carl Bonner — Norfolk State University



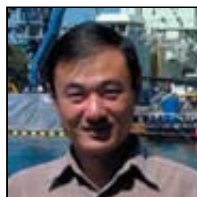
(Chemistry) Hetero-epitaxy of single crystal organic materials with nonlinear optical properties on silicon. Design and characterization of the molecular and macroscopic second hyperpolarizability based properties, two-photon absorption, and nonlinear refractive index in a range of substituted thiocyanine dyes.

Jean-Luc Bredas — Georgia Institute of Technology



(Chemistry & Biochemistry) Theoretical investigations based on computational techniques to investigate 1) electronic properties of conjugated polymer, oligomer, or molecular materials; 2) new oligomer or polymer structures leading to enhanced 2nd/3rd order NLO properties; 3) electronic structure of organic/ metal interfaces; 4) mechanisms for charge/ energy transport in conjugated organic materials

Antao Chen — University of Washington



(Applied Physics, Electrical Engineering) Nonlinear optical polymer materials and optical waveguide devices, fiber optic devices for telecommunication and radio frequency applications, optical sensors for bio- and chemical detection, and nanometer scale photonic structures.

Larry Dalton — University of Washington



(Chemistry, Electrical Engineering) Materials chemistry with particular emphasis on high technology electronic, electro-optic, and nonlinear optical materials. Emphasis on nanoscale materials and architectural construction techniques.

Peter Delfyett — University of Central Florida



(Optics, Electrical & Computer Engineering, Physics) Laser system development and optoelectronics. Short pulse semiconductor laser development, external cavity semiconductor laser devices and devices for optical networks. High data rate photonic networks through techniques for optical clock distribution, multi-wavelength source synchronization, and all-optical clock recovery.

Scott Dunham — University of Washington



(Electrical Engineering) Modeling of integrated circuit fabrication processes, with emphasis on interactions involving point and extended defects; computational materials, focused on study of the atomistic basis of solid-state diffusion and aggregation processes; modeling of semiconductor device behavior; modeling of fabrication and operation of microstructures.

Mahmoud Fallahi — University of Arizona



(Optical Sciences) – High power semiconductor lasers, DFB/DBR lasers, grating-assisted integrated optics, photonic integrated circuits, optical communication, wavelength multiplexers and demultiplexers, wavelength filters, solgel semiconductor integration, WDM components, sensors, design and microfabrication, nanofabrication and nanostructures, solgel PIC.

David Ginger — University of Washington



(Chemistry) Interplay between the organizational structure, the electrical properties, and the optical properties of nanoscale materials. Three current projects: (1) the impact of morphology on charge separation and recombination in organic semiconductors (2) charge-exciton coupling in semiconductor quantum dots; and (3) nanoscale plasmon optics.

Sam Graham — Georgia Institute of Technology



(Mechanical Engineering) Properties of thin-films used to create MEMS and nanotechnology devices, concentrating on the growth of thin films and characterization of their thermal transport properties and reliability. Focus on polycrystalline thin-films as well as ceramic and electrodeposited materials for MEMS devices and fuel cells.

Michael Hayden — University of Maryland Baltimore County



(Physics) Development and characterization of efficient, wide-band emitter-detector pairs of electro-optic polymer composites useful for the generation and detection of THz radiation. Exploration of new terahertz technologies. Atomistic molecular modeling of electric field poling and far-IR absorption in electro-optic polymers.

Alex Jen — University of Washington



(Materials Science & Engineering; EO-AOS Thrust Leader) Development of new organic synthetic methodologies of making highly efficient, processible, and thermally stable chromophores and polymers for nonlinear optical, light-emitting (electroluminescence, lasing), and imaging/microfab (two-photon absorption) applications. Device fabrication.

Sam Jenekhe — University of Washington



(Chemical Engineering & Chemistry) Understanding the influence of electronic, molecular, and supramolecular structures and morphology of conjugated polymers on their photoconductivity, luminescence, and charge transport properties. The study of synthetic self-assembling nanostructures and microstructures of well defined size, shape, and function.

Anthony Johnson — University of Maryland Baltimore County



(Physics, Computer Science, Electrical Engineering) Ultrafast photophysics and nonlinear optical properties of bulk, nanostructured, and quantum well semiconductor structures, ultrashort pulse propagation in fibers and highspeed lightwave systems.

Bart Kahr — University of Washington



(Chemistry) - Understanding the growth, structure, and physical properties of organized media including new crystalline materials and ordered biological structures, as evidenced by their interactions with polarized light.

Bernard Kippelen — Georgia Institute of Technology



(Electrical & Computer Engineering; LSOE Thrust Leader) Organic light-emitting devices for displays and lighting; flexible organic photovoltaic cells for power generation; low-cost organic electronics for RFID; real-time holography and signal processing; ultra-fast photonics; and, structure-property relationships in photonic and electronic material.

Lih Lin — University of Washington



(Electrical Engineering) Nano-scale photonic devices and integrated systems, bio photonics, micro-instrumentation by optical MEMS, self-assembled systems, and nanomaterials.

Michal Lipson — Cornell



(Electrical and Computer Engineering) Physics and application of nanoscale photonic structures. Light confining structures that enhance light-matter interaction, enabling the devices' optical properties to be controlled optically or electrooptically. Development of building blocks for an all-optical circuit where passive and active components are integrated on a single chip.

Seth Marder— Georgia Institute of Technology



(Chemistry & Biochemistry) Development of materials for nonlinear optics, applications of organic dyes for photonic, display, electronic, and medical applications, and organometallic chemistry. Understanding how the chemical structures of molecules and materials relate to their electronic and optical properties, and how to control the interactions of light and matter.

Dominic McGrath — University of Arizona



(Chemistry) Use of organic synthesis for the design, development, and application of new concepts in macromolecular, supramolecular, and materials chemistry. Synthesis of welldefined molecular architectures for nanometer scale technologies including light emitting diodes and photovoltaics.

Ann Mescher — University of Washington



(Mechanical Engineering) Fabrication of photonic bandgap polymer fiber and polymer fiber with third order harmonic generator. Integration of thermal- fluids sciences and materials processing, with emphasis on the relation between the material properties of a manufactured product and its processing conditions.

Joseph Perry — Georgia Institute of Technology



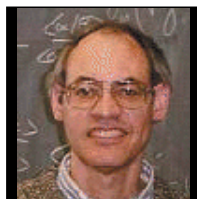
(Chemistry & Biochemistry) Molecular nonlinear optical properties; laser spectroscopy; twophoton and multi-photon absorption; nonlinear photoactive materials for 3D patterning; 3D micro-and nano-fabrication, and two-photon fluorescence probes for biological imaging and sensing.

Nasser Peyghambarian — University of Arizona



(Optical Sciences) Femtosecond laser spectroscopy and dynamics of optical phenomena in semiconductors and organic materials. Fiber lasers, fiber amplifiers and fiber optics components. Nonlinear photonics and high speed optical switching. Characterization of optical materials. Polymer optoelectronics, photorefractive polymers, organic light emitting diodes and lasers.

John Rehr— University of Washington



(Physics) Development of multiple scattering calculations for interpreting the X-ray Absorption Fine Structure (EXAFS) and X-ray Absorption Near-Edge Structure (XANES) spectra for clusters of atoms.

Phil Reid — University of Washington



(Chemistry) Linear and non-linear microscopy of non-linear optical materials. Development of novel optical materials for telecommunications and information processing, using a variety of spectroscopic techniques to characterize nonlinear optical materials.

Elisa Riedo — Georgia Institute of Technology



(Physics) UHV surface science characterization (STM, LEED, TDS) of metal and metal oxides surfaces, thin film surfaces, and nanostructures ; experimental nanomechanics and nanotribology with atomic force microscopes (friction, adhesion, elasticity, wear); amorphous carbon thin films

Bruce Robinson — University of Washington



(Chemistry) Theoretical calculations of nonlinear optical materials. Use of Electron Paramagnetic Resonance (EPR) techniques, including continuous wave and pulsed Saturation Recovery (pSR) and pulsed Electron-Electron Double Resonance (pELDOR) EPR.

S. Scott Saavedra — University of Arizona



(Chemistry) Multidisciplinary research activities organized around several overlapping themes: the chemistry of bio-interfaces and analytical techniques appropriate to study them, new molecular assemblies for molecular device technologies such as chemical sensing and energy storage/transduction, and development of molecular devices based on optical waveguide transducers.

Axel Scherer — California Institute of Technology



(Electrical Engineering, Applied Physics, Physics). Device fabrication based on nanostructures for new optoelectronic, magneto-optic and highspeed electronic applications. Vertical cavity surface emitting lasers, microfabrication of photonic bandgap crystals, high resolution lithography with anisotropic transfer of mask patterns to produce 6 nm size features.

Vicente Talanquer — University of Arizona



(Chemistry). Two primary areas of scholarly interest: chemical education and theoretical research in physical chemistry. The focal point is the study, reflection, and improvement of chemistry education and science teacher preparation; research in science furthers our understanding of fundamental processes in the dynamics of phase transitions.

Denise Wilson — University of Washington



(Electrical Engineering). Building compact systems on chip type nodes for such distributed microsystems. The sensing elements contain large quantities of sensors at various nodes and within nodes to gather large amounts of sensory information for redundancy and robustness. Attention to the entire system at every level of design enables small, accurate sensing nodes that do not overwhelm the total computational capability.