AMBASSADE DE FRANCE AUX ETATS-UNIS
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Le California NanoSystem Institute (CNSI)

Cette note complémente les TD SF et LA : 466/00, 170/01 et 171/01 de Roy et Raud qui traitaient plus largement des 3 Centres californiens.

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La Californie vient d'annoncer, par la voix de son Gouverneur Gray Davis, la création de trois Centres de Recherche pour un budget global de quatre ans se montant à 900 millions de dollars. Chaque institution recevra de l'Etat 25 millions de dollars par an et devra s'assurer d'un financement complémentaire provenant du secteur privé pour au moins deux fois ce montant. La compétition était limitée aux différents campus de l'Université de Californie (Berkeley, Davis, Irvine, Los Angeles, Merced, Riverside, San Diego, San Francisco, Santa Barbara et Santa Cruz), l'Institut devant être localisé sur l'un d'entre eux avec une association possible avec d'autres. Le but de cette opération était de renforcer le potentiel en recherche fondamentale d'un Etat déjà très bien placé dans ce domaine et surtout de réinvestir les fruits de la croissance qui a été particulièrement bénéfique sur la côte Ouest.

Mise sur les rails de la procédure législative l'hiver dernier et votée de façon bi-partisane par les Démocrates et les Républicains au printemps dernier, la proposition du Congrès de l'Etat de Californie a enfin abouti à la nomination des trois lauréats :

- Bio-Engénierie, Bio-Technologie et Bio-Médecine Quantitative : dirigé par David Agard et localisé à UC San Francisco en partenariat avec UC Berkeley et UC Santa Cruz.
- Télécommunications et Technologies de l'Information : dirigé par Larry Smarr et localisé à UC San Diego en partenariat avec UC Irvine.
- Nanosystèmes : dirigé par Martha Krebs et localisé à UC Los Angeles en partenariat avec Santa Barbara.

Un quatrième Centre, localisé à UC Berkeley, est d'ores et déjà prévu pour l'année prochaine. Il portera encore sur les technologies de l'information mais, dans ce cas, sur leurs applications aux phénomènes de société (transport, éducation, gestion des urgences, soins médicaux).

Le *California NanoSystem Institute* (CNSI), le plus proche des intérêts de la communauté des Sciences des Matériaux, est construit autour de cinq grands thèmes : Unités élémentaires -*Building blocks*-, Analyse et Imagerie, Modélisation, Simulation et Gestion de Données, et enfin Nanosytèmes en Médecine Moléculaire et en Technologie de l'Information. On retrouve à sa tête, Martha Krebs, le Directeur de l'*Office of Science* du DoE jusqu'au mois de juin dernier. Elle est entourée de deux directeurs scientifiques (James Heath de UCLA et Evelyn Hu de UCSB) et d'un Conseil composé d'experts scientifiques externes à l'Institut, de représentants de l'Etat de Californie et du secteur industriel. En plus des actions de recherche proprement dites, on y retrouve des actions de formation (étudiants, formation permanente auprès du secteur privé) et une branche de relations industrielles qui devra être assez importante au vu de la contribution du secteur privé. L'Institut proposera aux entreprises partenaires des espaces de bureaux et de laboratoire et offrira la possibilité d'abriter des jeunes pousses (*start up*) dans son incubateur. Les équipements de l'Institut seront accessibles aux Entreprises grâce aux *facilities*, des regroupements d'appareillages et de personnels ; il est au moins déjà prévu un centre de RMN et un centre de fabrication de systèmes moléculaires.

L'Institut est effectivement composé de la réunion d'équipes déjà existantes sur les deux campus de UCLA et UCSB et les financements alloués iront à la construction de nouveaux bâtiments et l'achat de nouveaux équipements sur les deux sites. Cette nouvelle manne devra surtout servir de pôle d'attraction pour une communauté scientifique de chercheurs en nanosciences. L'interdisciplinarité affichée dans la création de cet Institut se traduit déjà par la variété de formation et d'origine des chercheurs qui le compose à UCLA et à UCSB. Le prestige de cette nouvelle organisation repose aussi sur quelques chercheurs de haute renommée : Galen Stucky (auto-assemblage, UCSB), Brad Chmelka (filtres moléculaires, UCSB), Toni Chan (algorithme, UCLA), Shuji Nakamura (LED, fraîchement arrivé du Japon à UCSB), David Eisenberg (X-ray de protéines, UCLA), Jim Speck (films minces, UCSB), sans oublier les deux directeurs scientifiques Evelyn Hu (fabrication microsystèmes, UCSB) et James Heath (électronique moléculaire, UCLA) et la prestigieuse personnalité de Martha Krebs.

Plus d'informations sur le *California NanoSystems Institute* à http://www.cnsi.ucla.edu/
et sur cette initiative de l'Etat de Californie à http://www.ucop.edu/california-institutes/announcement.html.

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Départements impliqués pour chaque Centre dans la constitution du CNSI

UCLA :

Chemistry and Biochemistry	http://www.chem.ucla.edu/
Computer Science	http://www.cs.ucla.edu/
School of Engineering and Applied Science	http://www.seas.ucla.edu/
Human Genetics	http://www.medsch.ucla.edu/som/humgen/
Mathematics	http://www.math.ucla.edu/
Molecular and Medical Pharmacology	http://www.nuc.ucla.edu/
Molecular Biology Institute (MBI)	http://www.mbi.ucla.edu/
Molecular, Cell and Developmental Biology	http://www.mcdb.ucla.edu/
Physics and Astronomy	http://www.physics.ucla.edu/
Physiology	http://www.medsch.ucla.edu/som/physio/

UCSB :

Chemical Engineering	http://squid.ucsb.edu/
Chemistry and Biochemistry	http://www.chem.ucsb.edu/
Computer Science	http://www.cs.ucsb.edu/
Electrical and Chemical Engineering	http://www.ece.ucsb.edu/
Materials	http://www.materials.ucsb.edu/
Mechanical and Environmental Engineering	http://www.engineering.ucsb.edu/me/
Physics	http://www.physics.ucsb.edu/

Thèmes de Recherche et Participants

Blocs élémentaires
Analyse et Imagerie
Modélisation, simulation et recherche de données
Nanosystèmes : médecine moléculaire
Nanosystème : technologie de l'information

Building Blocks http://www.cnsi.ucla.edu/faculty.html#Blocks

Faculty Member	School	Research Interests
Bazan, Guillermo	UCSB	Design of well-defined initiators for polymerization reactions, the study of photophysical processes in advanced organic photonic materials and the design of interconnects for bringing together molecular wires.
Bowie, James	UCLA	Protein Structure/Signal Transduction.
Cheetham, Tony	UCSB	Characterization and Modeling of Inorganic Materials; Synthesis and Properties of Open-framework Materials and Transition Metal oxides.
DenBaars, Steve	UCSB	Develop an understanding of novel materials and extend them into applications.
Friedlander, Sheldon	UCLA	Aerosol Engineering, the science and technology of fine particles in gases, with applications to air pollution and advanced materials.
Gossard, Art	UCSB	Quantum Structure Growth, Science and Technology; High Performance Graded Quantum Structures; Quantum Wire and Quantum Dot Growth and Devices; MBE Technology for Ultrafast, Ultra-high-density Optoelectronic Devices; Smart Optoelectronic Pixel Technology; Cryogenic Lasers for Low-Temperature Electronics; Advanced Infrared Detectors Based on Strained Layer Superlattices.
Kaner, Richard	UCLA	Our solid state research group concentrates on the synthesis and characterization of new materials.
Kramer, Ed	UCSB	Mesoscale polymer physics involving interfacial structure and properties utilizing quantitative transmission electron microscopy, Rutherford backscattering and forward recoil spectrometry, secondary ion mass spectrometry and neutron reflectometry.
Monbouquette, Harold	UCLA	Molecular engineering of innovative systems that mimic the biological (i.e., biomimetic systems) in efforts to solve technological problems.
Morse, Dan	UCSB	Proteins, genes and molecular mechanisms controlling biological nanofabrication of high-performance mineral-organic composites, and innovative strategies to harness these mechanisms for new routes to nanofabrication of electronic, magnetic and optical materials.
Nakamura, Shuji	UCSB	Crystal growth, Light-emitting diodes and laser diodes.
Petroff, Pierre	UCSB	Crystal growth and epitaxy with emphasis on understanding the fundamental processes involved in the epitaxy of semiconductors for producing novel self assembling nanostructure.
Pine, David	UCSB	Soft materials, multiple light scattering, and photonic crystals.
Stoddart, Fraser	UCLA	The Stoddart group addresses contemporary issues in molecular, supramolecular and macromolecular chemistry.
Stucky, Galen	UCSB	Derive a general methodology for the creation by molecular assembly of integrated systems.

Tirrell, Matt	UCSB	Polymer surface properties including adsorption, adhesion, surface treatment, friction, lubrication and biocompatibility.
Tolbert, Sarah	UCLA	Understanding and Control of Structure and Periodicity in Complex Nanostructured Composites.
Wudl, Fred	UCLA	Organic metals/superconductors, organic ferromagnets and conjugated polymers.
Yeates, Todd	UCLA	Our interests cover various aspects of protein structure and function, protein sequence and evolution, and protein assembly and design.

Analytics and Imaging http://www.cnsi.ucla.edu/faculty.html#Analytics

Faculty Member	School	Research Interests & Funding
Bezanilla, Francisco	UCLA	Biophysics of excitation: Structure Function in Voltage Dependent Ionic Channels
Brown, Stuart	UCLA	Roles of dimensionality, electronic correlations, and disorder in the properties of electronic materials.
Buratto, Steve	UCSB	
Cherry, Simon	UCLA	Molecular Imaging Technology.
Chan, Tony	UCLA	Image Processing.
Chmelka, Brad	UCSB	Molecular Sieves (Zeolites), Polymer Structure and Dynamics, Inorganic-Organic Hybrid Materials, and NMR Spectroscopy.
Cleland, Andrew	UCSB	Nanoscale electronic and mechanical devices, exploring their uses as novel and ultrasensitive sensors and imaging devices.
Clubb, Robert	UCLA	Understanding how protein-DNA and protein-protein interactions orchestrate the assembly of nucleoprotein complexes that mediate DNA transposition and site-specific recombination.
Eisenberg, David	UCLA	Protein interactions are studied by X-ray crystallography, and computational and biochemical methods.
Feigon, Juli	UCLA	Nucleic acid structure and sequence specific recognition of nucleic acids by proteins, peptides, and drugs.
Gambhir, Sanjiv	UCLA	Imaging Approaches to Gene Therapy; Mathematical Modeling, Bio-imaging Assays, Computer Aided Education.
Grüner, George	UCLA	Professor George Grüner's group uses a combination of experimental techniques to study electrodynamics of various solids.
Hansma, Paul	UCSB	Scientific instrumentation and biophysics.
Herschman, Harvey	UCLA	Identification and characterization of genes that may mediate inflammatory response, modulate neuronal differentiation and modulate neuronal plasticity. Development of procedures in image reporter gene expression.
Holczer, Karoly	UCLA	Experimental condensed matter physics; organic conductors and superconductors and electron paramagnetic resonance.
Hubbell, Wayne	UCLA	Phototransduction, voltage-dependent membrane switching and active membrane transport are our primary research focuses. These processes involve membrane proteins that function through conformational changes regulated by light, transmembrane potential and energy sources, respectively. The immediate goal is to determine the molecular mechanisms underlying these conformational transitions.
Phelps, Michael	UCLA	Molecular Imaging and Molecular Pharmacology.
Speck, Jim	UCSB	Relationship between thin film electronic materials growth, microstructure,

		and the relation between microstructure and physical properties.
Stewart, Phoebe L.	UCLA	Cryo-EM Imaging of Macromolecular Assemblies.
Zocchi, Giovanni	UCLA	The main research topic in the lab is the study of conformational changes of biological macromolecules (proteins, DNA).

Modeling, Simulation and Data Mining http://www.cnsi.ucla.edu/faculty.html#Modeling

Faculty Member	School	Research Interests & Funding
Agrawal, Divy	UCSB	Distributed systems, databases, digital libraries, scalable and fault-tolerant access to multimedia data and digital libraries.
Anderson, Chris	UCLA	Numerical Analysis, Computational Solution of PDE's, Software for Technical Computing.
Bagrodia, Rajive	UCLA	Distributed algorithms, parallel languages, programming methodology and performance evaluation.
Caflisch, Russel	UCLA	Mathematical modeling and numerical simulation for epitaxial growth, including Monte Carlo, continuum and bulk modeling. Applications of control. Acceleration of Monte Carlo methods.
Carter, Emily A.	UCLA	Characterization of metal-ceramic and ceramic-ceramic interfaces (how they form and degrade, and how to optimize interfacial adhesion), chemisorption and reaction of molecules on metals and metal oxides, and the degradation of metals via corrosion and embrittlement.
Chan, Tony	UCLA	Applies linear and non-linear algebraic algorithms to the solution of large systems of equations arising in scientific computing, including conjugate gradient methods, domain decomposition and multi-level elliptic solvers, nonlinear PDE methods in image processing, algorithms for optimal VLSI circuit layout, and the efficient implementation of these algorithms on advnced architecture parallel computers.
Engquist, Bjorn	UCLA	General fields of numerical analysis, applied partial differential equations and scientific computing.
Green, Mark	UCLA	Algebraic geometry and commutative algebra, with an emphasis on Hodge theory; differential geometry, motion of curves and surfaces.
Kuchera-Morin, JoAnn	UCSB	Multimedia Composition, 3D Immersive Physical Sound Environments, 3D Immersive Virtual Sound Environments, Auralization, Distributed Multimedia Computing Environments.
Lange, Ken	UCLA	Human genetics, population biology, biomedical imaging, computational statistics, and applied stochastic processes.
Lee, Christopher	UCLA	Bioinformatics of the proteome.
Metiu, Horia	UCSB	Catalysis in zeolites and on metal nanoparticles supported on oxides; single-molecule quantum mechanics; electronic structure and transport in thermoelectric materials; theoretical chemical physics.
Osher, Stan	UCLA	Research consists of developing innovative numerical methods to solve partial differential equations, especially those whose solutions have steep gradients, analysis of these algorithms and the underlying P.D.E.'s and applications to various areas of Engineering, Physics, graphics, computer vision and image processing.
Peltonen, Leena	UCLA	Mutations and variants in human disease genes.
Petzold, Linda	UCSB	Numerical ordinary differential equations, differential-algebraic equations, and partial differential equations, dynamic optimization, nonlinear model reduction, mathematical software and scientific computing.

Sinsheimer, Janet	UCLA	My work in Bayesian inference tests for the reconstruction of evolutionary relationships (phylogenetic reconstruction) has as one of its goals the development of objective prior distributions based on observable properties of the data.
Tadmor, Eitan	UCLA	Numerical analysis, Applied Partial Differential Equations and Scientific computing.

Nanosystems: Molecular Medicine http://www.cnsi.ucla.edu/faculty.html#Medicine

Faculty Member	School	Research Interests & Funding
Chen, Gang	UCLA	Transport phenomena in micro- and nanoengineered materials and structures, low-dimensional thermoelectrics, micro-thermal-electric cooling and power generation devices and systems, microelectronics and photonics thermal management, nanorobotics and microelectromechanical systems, and their application in biomedical devices.
Goldberg, Robert B.	UCLA	How plant cells become specialized during development.
Grunstein, Michael	UCLA	Chromosomal structure and gene activity.
Ho, Chih-Ming	UCLA	Large scale integrated MEMS, control of turbulent flows, unsteady aerodynamics, experimental biofluid mechanics, jet and rotor-stator noise.
Ignarro, Louis	UCLA	Regulation and modulation of NO production.
Liao, James	UCLA	We develop novel technologies for metabolic genomics research in microbial and human systems. Our research integrates molecular biology and chip-based technologies to investigate molecular recognition, signal amplification, and biological regulation.
Nelson, Stan	UCLA	Genetic Technology Development.
Vergara, Julio	UCLA	Biophysical analysis of basic physiological processes, with an emphasis on calcium imaging in real time.
Witte, Owen N.	UCLA	Development of the immune system and cancer.

Nanosystems: Information Technology http://www.cnsi.ucla.edu/faculty.html#InfoTech

Faculty Member	School	Research Interests & Funding
Awschalom, David	UCSB	Optical and magnetic interactions in semiconductor quantum structures spin dynamics and coherence in condensed matter systems, and macroscopic quantum phenomena in nanometer-scale magnets.
Coldren, Larry	UCSB	Integration of various optoelectronic devices, including optical amplifier and switches, tunable lasers, receivers, and surface-emitting lasers.
Grundfest, Warren	UCLA	Biologic spectroscopy, Photo Dynamic Therapy (PDT), excimer laser application in medicine, development of new lasers, minimally invasive surgery, energy tissue interaction, MRI compatible tools and instruments, and image guided therapy.
Heath, James	UCLA	Architectures and devices for molecular electronics; nonlinear optical imaging techniques applied to physiological active biomolecules; quantum phase transitions in quantum dot designed solids.

Hu, Evelyn	UCSB	Low-damage, high spatial resolution fabrication techniques for novel device structures. Approaches for achieving heterogeneous materials integration in devices.
Imamoglu, Atac	UCSB	Semiconductor quantum optics, quantum information processing, quantum dot physics, single photon nonlinear optics.
Jiang, Hong-Wen	UCLA	Exploring new phenomena of low-dimensional semiconductor systems. Developing single electron/spin nano-devices for quantum computing and quantum communication.
MacDonald, Noel	UCSB	MEMS, Applied Physics, Materials, Mechanics, Nano Fabrication.
Mishra, Umesh	UCSB	Develop an understanding of novel materials and extend them into applications.
Mitragotri, Samir	UCSB	Development of novel methods of drug delivery and diagnostics.
Wang, Kang	UCLA	Novel device concepts, nanoelectronics and optoelectronics, quantum size effect, and reduced dimensional structures, MBE and superlattices.
Woo, Jason	UCLA	Solid-state technology, device physics, MOS and bipolar device characteristics at low temperatures, modeling of integrated circuits, VLSI fabrication.
Wu, Ming	UCLA	Ultrafast integrated optoelectronics, optical interconnect, micro-opto-mechanical systems.
Yablonovitch, Eli	UCLA	Optoelectronics, high-speed optical communications, high-efficiency light-emitting diodes and nano-cavity lasers, photonic crystals at optica and microwave frequencies, quantum computing and communication.
York, Bob	UCSB	Application of emerging electronic materials for high frequency RF/microwave devices, circuits and systems.