

California Energy Research Center (CERC) Activities

I. Strategic Vision for CERC

Focal Areas – Petroleum, Energy, Water, Agriculture, Materials, Environment, Biotech, Computing, Education.



- *Vision*
- *Top Energy Center* in the State of California in five years,
- **Nationally Recognized Energy Center in 10 – 15 years.**
- *Mission*
- Prepare graduate and undergraduate students to enter into Energy related positions and *leadership positions in industry*, government or continue their studies in *graduate school*.



II. A Vision for the Future of CERC

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- Emergence of **New Research Areas: Nexus – Energy / Water / Agriculture**
- **State-of-the-Art Teaching and Facilities.**
- Faculty International and National **Professional Leadership Roles.**
- Outreach with **State and Local Leadership and Companies.**



CERC and NSME Statistics

3

CERC Associated Faculty – 21

NSME (School) Statistics

7 Departments

Faculty – 64

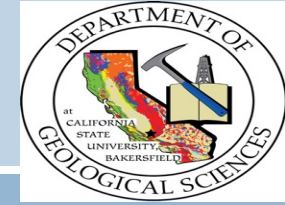
Approx. \$24M in grant funding.

**Data from CSUB NSME and CERC
webpage – <https://www.csub.edu/energycenter/>**





Geology



- *NSF CREST Center \$10.5 Million over 10 years*
- **Plus over \$2.5 Million in other external grants**
- *Petroleum geology, GIS,*
- *Hydrogeology, environmental geology, geoscience education, geochemical modeling, environmental geochemistry, Oil reservoir/source rock diagenesis,*
- *Earth surface processes, Hazard Assessment,*
- *Biogeochemistry.*
- **Department Faculty – Dirk Baron, C. Basak, Jan Gillespie, Adam Guo, Chris Krugh, Miller, O’Sullivan, Anthony Rathburn.**



Biology

- *Biofuels,*
- *Genomics,*
- *Molecular genetics,*
- *Plant biology,*
- *Plant ecology,*
- *Microbial biology,*

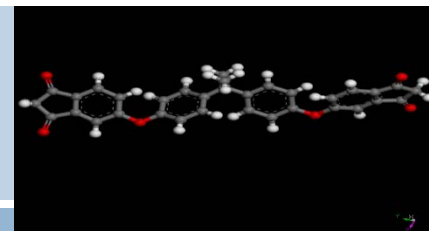
**Department Faculty: Anna Jacobsen,
Brandon Pratt, Jeroen Gillard, Isolde
Francis, Paul Smith.**



CT Scanner



Chemistry and Biochemistry



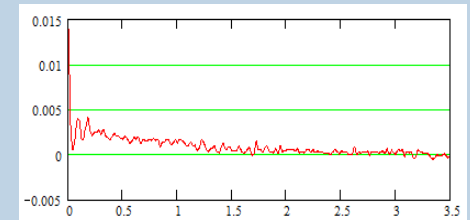
- *Solar & Photoelectrochemical Cells*
- *Synthesis of cobalt electron mediators for use in PSI biohybrid dye-sensitized solar cells.*
- *Synthesis of chromophores for use in tandem dye-sensitized photoelectrochemical cells.*
- *Energy Education Research*

**Department Faculty: Jesse Bergkamp,
Marina Shapiro**



Mathematics

- *Quantifying Uncertainty Using A Stochastic Basis Method; An Application To Optimization Of Well Placement,*
- *Statistics from the Sierra snowpack data.*



Department Faculty: Prosper Torsu, Eduardo Montoya



Electrical Engineering, Computer Engineering, Computer Science

- *Big Data, Artificial Intelligence,*
- *Power Grid Analysis and Power Systems,*
- *Cybersecurity, Energy Efficient Communication Systems, Internet-of-Things, Wireless Sensor Nets, Robotics, Control Systems, Embedded Systems*



Simulator



Electrical Engineering, Computer Engineering, Computer Science

- *Image Processing, Computer Vision,*
- *Smart Control System for Pumping Units*
- *Based on Big Data Analysis*



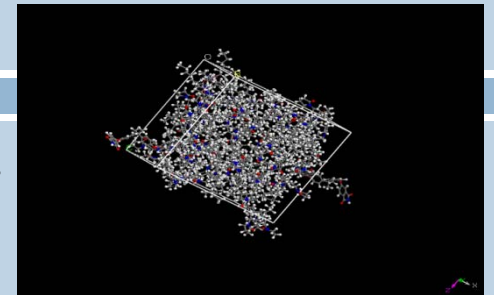
Simulator

Department Faculty: Saeed Jafarzadeh, Ehsan Reihani, Vida Vakilian, Reza Abdolee, Wei Li,, Alberto Cruz, Anthony Bianchi, Chengwei Leai, Melissa Danforth, Charles Lam (Mathematics), Antonio Cardenas.



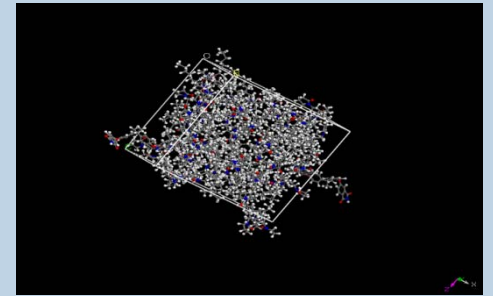
Physics and Engineering

- *Treatment of produced water for agriculture*
- *Fuel Cells - Proton Exchange Membranes*
- *Flow Assurance, Subsea Well/Pipeline Thermodynamics/*
- *Heat Transfer, Rarefied Gas Dynamics, Remote Sensing*
- *Renewable Energy Extraction Device (patent).*
- *Increasing the Productivity of the Engineering Degree Pipeline in the High Needs Southern San Joaquin Valley.*



Physics and Engineering

- *Condensed Matter Physics, Quantum Dots*
- *Low Dimensional Disordered Systems and*
- *Nanostructured Dilute Photonic Crystals.*



Department Faculty: Vladimir Gasparyan, Tat Acharya, Karim Salehpoor, Jorge Talamantes, Luis Cabrales, Travis Moore, Peng Guo, Alan Fuchs



Economic Development

- *Bakersfield / Kern Co. Industrial Research*
- *Start up companies*
- *Invention disclosures*
- *Energy Economics and Policy*

Alumni and Corporate Support

- *Alumni Involvement*
- *Endowed scholarships and fellowships*
- *Endowed faculty positions*



VI. Global Engineering Education

- 1) State of the art undergraduate curricula.*
- 2) Internationally competitive graduate program*
- 3) High quality outreach*
- 4) Global experiences.*



Engineering and Science Entrepreneurship

- *Work with new company startups - Incubator*
- *Intellectual Property*
- *American Inst. Of Chemical Engineering - CEOC*

