



NEUP

Nuclear Energy
University Programs

U.S. Department of Energy

2010 NEUP R&D

| Project Title | Program Area | Lead University | Principal Investigator | Collaborators | Award Amount |
|---|--------------|---|------------------------|--|--------------|
| Evaluation of Materials for interim Storage of Spent Fuel for More Than 100 Years | FCR&D | <i>University of Michigan</i> | Lumin Wang | | \$931,603 |
| Freeze-Casting as a Novel Manufacturing Process for Fast Reactor Fuels | FCR&D | <i>Drexel University</i> | Ulrike G. K. Wegst | • Todd Allen - <i>University of Wisconsin, Madison</i> | \$1,149,327 |
| Development of a Innovative High Thermal Conductivity UO ₂ Ceramic Composites Fuel Pellets with Carbon Nano-Tubes Using Spark Plasma Sintering | FCR&D | <i>University of Florida</i> | Ghatu Subhash | • Kuang-His Wu - <i>Florida International University</i> | \$894,042 |
| Fuel Performance Experiments on the Atomistic Level, Studying Fuel Through Engineered Single Crystal UO ₂ | FCR&D | <i>Idaho State University</i> | George Imel | • Allan Hunt - <i>Idaho State University</i> • Christopher Summers - <i>Georgia Institute of Technology</i> • Eric Burgett - <i>Idaho State University</i> • George Imel - <i>Idaho State University</i> • Simon Phillpot - <i>University of Florida</i> | \$650,000 |
| Implementation of On-the-Fly Doppler Broadening in MCNP5 for Multiphysics Simulation of Nuclear Reactors | FCR&D | <i>University of Michigan</i> | William Martin | • Gokhan Yesilyurt - <i>Oak Ridge National Laboratory</i> | \$406,712 |
| Methods and Tools to Allow Molecular Flow Simulations to Be Coupled to Higher Level Continuum Descriptions of Flows in Porous/Fractured Media and Aerosol/Dust Dynamics | FCR&D | <i>University of Missouri, Columbia</i> | Sudarshan Loyalka | | \$541,286 |
| The Influence of Adding Physics on Predictive Maturity of a Numerical Code | FCR&D | <i>Clemson University</i> | Sez Atamturktur | • Brian Williams - <i>Los Alamos National Laboratory</i> • Cetin Unal - <i>Los Alamos National Laboratory</i> • Francois Hemez - <i>Los Alamos National Laboratory</i> • Carlos Tome - <i>Los Alamos National Laboratory</i> | \$614,690 |
| Development of A Self-Biased High Efficiency Solid-State Neutron Detector for MPACT Applications | FCR&D | <i>Rensselaer Polytechnic Institute</i> | Yaron Danon | • Ishwara Bhat - <i>Rensselaer Polytechnic Institute</i> • James Lu - <i>Rensselaer Polytechnic Institute</i> | \$810,141 |
| Modeling Solute Thermokinetics in LiCl-KCl Molten Salt for Nuclear Waste Separation | FCR&D | <i>University of Wisconsin, Madison</i> | Dane Morgan | • Jacob Eapen - <i>North Carolina State University</i> | \$616,073 |

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|--|--------------|--|------------------------|---|--------------|
| Characterization and Modeling of Materials for Kr-Xe Separations | FCR&D | <i>University of Nevada, Las Vegas</i> | Paul Forster | <ul style="list-style-type: none"> Balakrishnan Naduvalath - <i>University of Nevada, Las Vegas</i> Kenneth Czerwinski - <i>University of Nevada, Las Vegas</i> Rose Stiffin - <i>Florida Memorial University</i> | \$989,800 |
| Advanced Aqueous Separation Systems for Actinide Partitioning | FCR&D | <i>Washington State University</i> | Ken Nash | <ul style="list-style-type: none"> Leigh Martin - <i>Idaho National Laboratory</i> Gregg Lumetta - <i>Pacific Northwest National Laboratory</i> | \$1,451,784 |
| Alpha Radiolysis of Nuclear Solvent Extraction Ligands used for An(III) and Ln(III) Separations | FCR&D | <i>California State University, Long Beach</i> | Stephen Mezyk | <ul style="list-style-type: none"> Bruce Mincher - <i>Idaho National Laboratory</i> Mikael Nilsson - <i>University of California, Irvine</i> | \$1,390,252 |
| Exploration and Modeling of Structural Changes in Waste Glass under Corrosion | FCR&D | <i>Pennsylvania State University</i> | Karl Mueller | <ul style="list-style-type: none"> Joseph V. Ryan - <i>Pacific Northwest National Laboratory</i> Denis Strachan - <i>Pacific Northwest National Laboratory</i> Carlo Pantano - <i>Pennsylvania State University</i> | \$1,377,444 |
| Development of Barrier Layers for the Protection of Candidate Alloys in the VHTR | Gen IV | <i>University of California, Santa Barbara</i> | Carlos Levi | <ul style="list-style-type: none"> Gary S. Was - <i>University of Michigan</i> Tresa M. Pollock - <i>University of California, Santa Barbara</i> | \$995,232 |
| Investigation of a Novel NDE Method for Monitoring Thermo-Mechanical Damage and Microstructure Evolution in Ferritic-Martensitic Steels for Generation IV Nuclear Energy Systems | Gen IV | <i>University of Cincinnati</i> | Peter Nagy | <ul style="list-style-type: none"> Dennis Kunerth - <i>Idaho National Laboratory</i> | \$833,109 |
| Monitoring Microstructural Evolution of Alloy 617 with Nonlinear Acoustics for Remaining Useful Life Prediction; Multiaxial Creep-Fatigue and Creep-Ratcheting | Gen IV | <i>Pennsylvania State University</i> | Cliff Lissenden | <ul style="list-style-type: none"> Tasnim Hassan - <i>North Carolina State University</i> Vijaya Rangari - <i>Tuskegee University</i> | \$1,000,000 |
| Three-dimensional NDE of VHTR Core Components via Simulation-Based Testing | Gen IV | <i>University of Minnesota</i> | Bojan Guzina | <ul style="list-style-type: none"> Dennis Kunerth - <i>Idaho National Laboratory</i> | \$1,366,163 |
| Development of a Scanning Microscale Fast Neutron Irradiation Platform for Examining the Correlation Between Local Neutron Damage and Graphite Microstructure | Gen IV | <i>University of Missouri, Columbia</i> | Patrick Pinhero | <ul style="list-style-type: none"> John Gahl - <i>University of Missouri, Columbia</i> Will Windes - <i>Idaho National Laboratory</i> William Miller - <i>University of Missouri, Columbia</i> | \$703,064 |
| Failure Predictions for VHTR Core Components using a Probabilistic Continuum Damage Mechanics Model | Gen IV | <i>University of Minnesota</i> | Alex Fok | | \$854,542 |
| Graphite and Carbon/Carbon Composites for Fluoride Salt Valves | Gen IV | <i>Johns Hopkins University</i> | Dennis Nagle | <ul style="list-style-type: none"> Yo-Rhin Rhim - <i>Johns Hopkins University</i> | \$1,183,239 |
| Heat Transfer Salts for Nuclear Reactor Systems - Chemistry Control, Corrosion Mitigation, and Modeling | Gen IV | <i>University of Wisconsin, Madison</i> | Mark Anderson | <ul style="list-style-type: none"> Bruce McNamara - <i>Pacific Northwest National Laboratory</i> Per F. Peterson - <i>University of California, Berkeley</i> Randall Scheele - <i>Pacific Northwest National Laboratory</i> Patrick Calderoni - <i>Idaho National Laboratory</i> Andrew Casella - <i>Pacific Northwest National Laboratory</i> | \$1,352,040 |

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|--|--------------|---|------------------------|--|--------------|
| Development of Thermal Transient Flow Rate Sensors for High Temperature, Irradiation, Corrosive Environment | Gen IV | <i>University of Nevada, Las Vegas</i> | Yingtao Jiang | <ul style="list-style-type: none"> Jian Ma - <i>University of Nevada, Las Vegas</i> Feng Shi - <i>Northern New Mexico College</i> | \$451,269 |
| Precursor Derived Nanostructured Si-C-X Materials for Nuclear Applications | Gen IV | <i>University of Washington</i> | Rajendra Bordia | <ul style="list-style-type: none"> Chuck Henager - <i>Pacific Northwest National Laboratory</i> Vikas Tomar - <i>Purdue University</i> | \$899,518 |
| Fission Product Transport in TRISP Particle Layers Under Operating and Off-Normal Conditions | Gen IV | <i>University of Michigan</i> | Anton Van Der Ven | <ul style="list-style-type: none"> Mitra Taheri - <i>Drexel University</i> | \$996,581 |
| Development and Validation of Multidimensional Models of Supercritical CO2 Energy Conversion Systems for Nuclear Power Reactors | Gen IV | <i>Rensselaer Polytechnic Institute</i> | Michael Podowski | | \$475,005 |
| Design, Testing, and Modeling of the Direct Reactor Auxiliary Cooling System for AHTRs | Gen IV | <i>Ohio State University</i> | Xiaodong Sun | <ul style="list-style-type: none"> Dane Wilson - <i>Oak Ridge National Laboratory</i> Graydon Yoder - <i>Oak Ridge National Laboratory</i> Thomas Blue - <i>Ohio State University</i> Richard Christensen - <i>Ohio State University</i> | \$1,366,627 |
| Novel Methods of Tritium Sequestration: High Temperature Gettering and Separation Membrane Materials Discovery for Nuclear Energy Systems | Gen IV | <i>University of South Carolina</i> | Fanglin (Frank) Chen | <ul style="list-style-type: none"> David Sholl - <i>Georgia Institute of Technology</i> Kyle Brinkman - <i>Savannah River National Laboratory</i> Kenneth Reifsnider - <i>University of South Carolina</i> Thad Adams - <i>Savannah River National Laboratory</i> Nan Ding - <i>Clafin University</i> | \$1,366,626 |
| Critical Experiments to Understand the Radiation Response of Materials for Fast Reactor Cladding and Duct Application | Gen IV | <i>University of Michigan</i> | Gary Was | <ul style="list-style-type: none"> Todd Allen - <i>University of Wisconsin, Madison</i> | \$1,181,379 |
| Microstructure Evolution in Advanced Structural Materials Under Long-Term and Elevated Temperature Irradiation: A Combined Materials Modeling and Experimental Investigation | Gen IV | <i>University of Tennessee, Knoxville</i> | Brian Wirth | <ul style="list-style-type: none"> Arthur Motta - <i>Pennsylvania State University</i> Dane Morgan - <i>University of Wisconsin, Madison</i> Djamel Kaoumi - <i>University of South Carolina</i> | \$1,320,667 |
| Pulsed Magnetic Welding for Advanced Core and Cladding Steels | Gen IV | <i>University of Wisconsin, Madison</i> | Yong Yang | | \$525,206 |
| Corrosion in Supercritical Carbon Dioxide: Materials, Environmental Purity, Surface Treatments, and Flow Issues | Gen IV | <i>University of Wisconsin, Madison</i> | Kumar Sridharan | | \$651,447 |
| Consistent Multigroup Theory Enabling Accurate Coarse-Group Simulation of Gen IV Reactors | Gen IV | <i>Georgia Institute of Technology</i> | Farzad Rahnema | <ul style="list-style-type: none"> Abderrafi M. Ougouag - <i>Idaho National Laboratory</i> Dingkang Zhang - <i>Georgia Institute of Technology</i> Alireza Haghighat - <i>University of Florida</i> | \$1,046,277 |
| Studies of Deteriorated Heat Transfer in Prismatic Cores Stemming from Irradiation-Induced Geometry Distortion | Gen IV | <i>Idaho State University</i> | Brian Williams | <ul style="list-style-type: none"> Richard Schultz - <i>Idaho National Laboratory</i> Donald McEligot - <i>Idaho National Laboratory</i> | \$1,287,921 |
| Multiscale Concrete Modeling for Aging Degradation | LWRS | <i>Mississippi State University</i> | Youssef Hammi | | \$345,941 |
| Development of an Advanced Computational Fluid Dynamics Technology for the Next-Generation Nuclear Reactor System Analysis and Safety Margin Characterization Code | LWRS | <i>North Carolina State University</i> | Hong Luo | <ul style="list-style-type: none"> Robert Nourgaliev - <i>Idaho National Laboratory</i> | \$418,199 |

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|--|--------------|------------------------------------|------------------------|--|--------------|
| Irradiation Accelerated Corrosion of Reactor Core Materials | MR-IIR | University of Michigan | Gary Was | • David Bartels - <i>University of Notre Dame</i> | \$798,943 |
| Understanding the Irradiation Behavior of Zirconium Carbide | MR-IIR | Pennsylvania State University | Arthur Motta | • Dane Morgan - <i>University of Wisconsin, Madison</i> • Izabela Szlufarska - <i>University of Wisconsin, Madison</i> • Todd Allen - <i>University of Wisconsin, Madison</i> • Yong Yang - <i>University of Wisconsin, Madison</i> | \$870,613 |
| Investigation of Laser Shock Peening for Enhancing Fatigue and Stress Corrosion Cracking Resistance of Nuclear Energy Materials | MR-IIR | University of Cincinnati | Vijay Vasudevan | • Bogdan Alexandreanu - <i>Argonne National Laboratory</i> • Yiren Chen - <i>Argonne National Laboratory</i> • John Jackson - <i>Idaho National Laboratory</i> • Sebastian Teyseyre - <i>Idaho National Laboratory</i> | \$1,242,019 |
| Novel Engineered Refractory Materials for Advanced Reactor Applications | MR-IIR | North Carolina State University | Steven Shannon | • Jacob Eapen - <i>North Carolina State University</i> • Jon-Paul Maria - <i>North Carolina State University</i> • William Weber - <i>Pacific Northwest National Laboratory</i> | \$1,129,304 |
| Development and Testing of an Open-Loop Oscillator for Small Reactivity Worth Samples | MR-IIR | Idaho State University | George Imel | • Gilles Youinou - <i>Idaho National Laboratory</i> • Eric Burgett - <i>Idaho State University</i> • Jason Harris - <i>Idaho State University</i> | \$597,252 |
| Modeling Investigation of the Stability and Irradiation-Induced Evolution of Nanoscale Precipitates in Advanced Structural Materials | MR-IIR | University of Tennessee, Knoxville | Brian Wirth | | \$380,653 |
| Study of Interfacial Interactions Using Thin Film Surface Modification: Radiation and Oxidation Effects in Materials | MR-IIR | University of Wisconsin, Madison | Kumar Sridharan | • Jinsuo Zhang - <i>Los Alamos National Laboratory</i> | \$538,032 |



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