

## Crosscutting Research, Rare Earth Elements, Gasification Systems, and Transformative Power Generation AGENDA AT A GLANCE

		<div>TRACK A: SENSORS AND CONTROLS TRANSFORMATIVE POWER GENERATION CROSSCUTTING RESEARCH</div>	<div>TRACK B: MATERIALS AND MODELING CROSSCUTTING RESEARCH</div>	<div>TRACK C: RARE EARTH ELEMENTS</div>	<div>TRACK D GASIFICATION SYSTEMS</div>												
8:00AM - 9:30 AM	TUESDAY, APRIL 9	PLENARY SESSION: WELCOME AND OPENING REMARKS - Angelos Kokkinos, Director, Office of Advanced Fossil Technology Systems, U.S. Department of Energy Technology Overviews: Briggs White, Crosscutting Research -- John Rockey, Transformative Power Generation -- David Lyons, Gasification Systems / National Energy Technology Laboratory															
9:30 AM		AM BREAK															
		SESSION A1: Power Plant Sensors Analysis		SESSION B 1: High Performance Materials		SESSION C1: Small Pilot, High Purity, REE Separation Systems		SESSION D1: Air Separation/Oxygen Production Session I									
		Organization	Title	Presenter	Moderator	Organization	Title	Presenter	Moderator	Organziation	Title	Presenter	Moderator				
10:00 AM		National Energy Technology Laboratory (NETL)	Existing Plants - Fleet Assessment	Jeff Hoffman	Benjamin Chorpening	Energy Industries of Ohio	Advanced Ultra-Supercritical Component Testing	Robert Purgert	Maria Reidpath	National Energy Technology Laboratory (NETL)	Rare Earth Elements Program Overview	Mary Anne Alvin	Richard Dunst	Thermosolv, LLC	Low-Cost Oxygen (LCO) for Small-Scale Modular Gasification Systems	Vijay Sethi	Seth Lawson
10:30 AM		National Energy Technology Laboratory (NETL)	Advanced Sensors And Controls - Market and Benefits Analysis	Erik Shuster		Lawrence Livermore National Laboratory	HPC4Materials - Program Overview	Robin Miles		Marshall Miller	Products from Coal and Coal Byproducts in the U.S. Using Advanced Separation Processes	Steven Keim		Thermosolv, LLC	Advanced Sorbents for Modular Oxygen Production for Radically Engineered Modular Systems (REMS) Gasifiers	Vijay Sethi	
11:00 AM		National Energy Technology Laboratory (NETL)	Dynamic Modeling of Steam-based Power Plants	Steve Zitney		National Energy Technology Laboratory (NETL)	Advanced Alloy Development - export analysis	Christa Court		Inventre Renewables	Recovery of Rare Earth Elements from Coal Mining Waste Materials	William Sutterlin		North Carolina State University	Radically Engineered Modular Air Separation System Using Tailored Oxygen Sorbents	Fanxing Li	
11:30 AM		Electric Power Research Institute (EPRI)	Evaluation of Steam Cycle Upgrades to Improve the Competitiveness of US Coal Fired Power Plants	Horst Hack		Oak Ridge National Laboratory (ORNL)	Materials Issues in Supercritical CO2	Bruce Pint		West Virginia University	Recovery of Rare Earth Elements from Coal Mine Drainage	Paul Ziemkiewicz	Richard Dunst	Research Triangle Institute (RTI)	Oxygen Binding Materials and Highly Efficient Modular System for Oxygen Production	Shaojun (James) Zhou	
NOON		LUNCH															
		SESSION A2: Sensors and Controls		SESSION B2: Multiphase Flow Modelinh		SESSION C2-2: Conventional REE Separation Systems		SESSION D2: Air Separation/Oxygen Production Session I									
1:00 PM	National Energy Technology Laboratory (NETL)	Advanced Sensors & Controls - Field Testing of Raman Gas Analyzer	Benjamin Chorpening	Karol Schrems	National Energy Technology Laboratory (NETL)	Advanced Reaction Systems (MFiX)	Mehrdad Shahnam	Jason Hissam	University of North Dakota	Investigation of Rare Earth Element Extraction from North Dakota Coal- Related Feedstocks	Nolan Theaker	Charles Miller	Research Triangle Institute (RTI)	Pilot Testing of a Modular Oxygen Production System Using Oxygen Binding Adsorbents	Shaojun (James) Zhou	Seth Lawson	
1:30 PM	Opto-Knowledge Systems, Inc.	Mid Infra-Red Laser Sensor for Continuous Sulfur Trioxide Monitoring to improve Coal-Fired Power Plant Performance During Flexible Operations	Jason Kriesel		University of Colorado	MFiX-DEM Enhancement for Industry-Relevant Flows	Christine Hrenya		Physical Sciences, Inc.	High Yield and Economical Production of Rare Earth Elements from Coal Ash	Prakash Joshi		University of South Carolina	Modularization of Ceramic Hollow Fiber Membrane Technology for Air Separation	Xingjian (Chris) Xue		
2:00 PM	University of Utah	Ultrasonic Measurements of Temperature Profile and Heat Fluxes in Coal-Fired Power Plants	Mikhail Skliar		University of Wyoming	Implementing General Framework in MFiX for Radiative Heat Transfer in Gas-Solid Reacting Flows	Michael Stoellinger		University Kentucky	Pilot-Scale Testing of An Integrated Circuit for the Extraction of Rare Earth Minerals and Elements from Coal and Coal By-products Using Advanced Separation Technologies	Rick Honaker		National Energy Technology Laboratory (NETL)	Development of Oxygen Carriers for Coal Conversion to Syngas	Jonathan Lekse		
2:30 PM	SparkCognition, Inc.	Application of Artificial Intelligence Techniques Enabling Coal-Fired Power Plants the Ability to Achieve Higher Efficiency, Improved Availability, and Increased Reliability of Their Operations	Stuart Gillen		University of North Dakota Energy and Environmental Research Center (UNDEERC)	Interfacing MFiX with PETSC and HYPRE Linear Solver Libraries	Gautham Krishnamoorthy		LANL	SESSION C3-1: Novel REE Separation & Advanced Sensor Development	SESSION D3-1: Reactor Engineering Design Session I						
3:00 PM	PM BREAK																
	SESSION A3: Sensors and Controls		SESSION B3: Advanced Process Simulation		SESSION C3-2: Novel REE Separation & Advanced Sensor Development		SESSION D3-2: Reactor Engineering Design Session I										
3:30 PM	West Virginia University Research Corporation	High Temperature Electrochemical Sensors for In-situ Corrosion Monitoring in Coal-Based Power Generation Boilers	Xingbo Liu	Omer Bakshi	National Energy Technology Laboratory (NETL)	Overview of DOE's Institute for the Design of Advanced Energy Systems	David Miller	Jason Hissam	LANL	Evaluation of Laser-Based Analysis of REE in Coal-Related Materials	George Guthrie	Anthony Zinn	Research Triangle Institute (RTI)	Advance Syngas Cleanup for Radically Engineered Modular Systems (REMS)	Atish Kataria	Steven Markovich	
4:00 PM	Microbeam Technologies, Inc.	Improving Coal Fired Plant Performance through Integrated Predictive and Condition-based Monitoring Tools	Shuchita Patwardhan		National Energy Technology Laboratory (NETL)	Advanced Modeling and Optimization to Support the Existing Fleet	Anthony Burgard		INL-LLNL	New sensing Mechanisms for REE Detection in Coal and Coal By-Products	Yoshiko Fujita		TDA Research, Inc.	Warm Gas Multi-Contaminant Removal System	Gokhan Alptekin		
4:30 PM	GE/Alstom	Extended Low Load Boiler Operation to Improve Performance and Economics of an Existing Coal Fired Power Plant	Robert Murphy		National Energy Technology Laboratory (NETL)	Design and Optimization of Coal Plants of the Future	Jaffer Ghouse		LLNL	Application of Biosorption of REE Recovery from Coal By-Products	Yongqin Jiao		TDA Research, Inc.	Poison Resistant Water-Gas-Shift Catalysts for Biomass and Coal Gasification	Girish Srinivas		
5:30:00 PM - 7:30 PM	POSTER SESSION 5:30 pm to 7:30 pm																

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	WEDNESDAY, APRIL 10	TRACK A: MATERIALS CROSSCUTTING RESEARCH				TRACK B: WATER MANAGEMENT CROSSCUTTING RESEARCH				TRACK C: RARE EARTH ELEMENTS				TRACK D: GASIFICATION SYSTEMS			
8:00 AM		WELCOME: Randall Gentry, Deputy Director & Chief Research Officer, National Energy Technology Laboratory KEYNOTE: STEVEN WINBERG, ASSISTANT SECRETARY FOR FOSSIL ENERGY, U.S. DEPARTMENT OF ENERGY															
		SESSION A4: eXtremeMat				SESSION B4: Energy-Water Nexus				SESSION C4: Transformational REE Separation				SESSION D4: Air Separation/Oxygen Production Session II			
		Organization	Title	Presenter	Moderator	Organization	Title	Presenter	Moderator	Organization	Title	Presenter	Moderator	Organization	Title	Presenter	Moderator
8:30 AM		eXtremeMAT National Laboratory Consortium - NETL	Overview of eXtremeMAT project	Jeff Hawk	Karol Schrems	National Energy Technology Laboratory (NETL)	Water Demand Coefficients of Power Generation	Tim Skone	Barbara Carney	Virginia Tech	Feasibility of Recovering Rare Earth Elements from Thickener Underflow	Roe-Hoan Yoon, Aaron Noble, and Jerry Luttrell	Charles Miller	Air Products and Chemicals, Inc.	Development of a Two-Phase Dense Fluid Expander for Advanced Cryogenic Air Separation and Low-Grade Heat Recovery	Scott Marchessault	Venkat Venkataraman
9:00 AM		eXtremeMAT National Laboratory Consortium - LANL	Computational Modeling and Simulation	Laurent Capolungo		Sandia National Laboratory	Water Atlas Extension	Vincent Tidwell		University of Kentucky	Low Temperature Plasma Treatment for Enhanced Recovery of Highly Valued Critical REEs from Coal	Rick Honaker		Idaho National Laboratory (INL)	Advanced Oxygen Separation from Air Using a Novel Mixed Matrix Membrane	Frederick Stewart	
9:30 AM		eXtremeMAT National Laboratory Consortium - PNNL	Data Science and Analytics	Ram Devanathan		National Energy Technology Laboratory (NETL)	2018 Water Brief	Jocelyn Mackay		Virginia Tech	Development of a Cost-Effective Extraction Process for the Recovery of Heavy and Critical REEs from the Clays and Shales Associated with Coal	Aaron Noble		Los Alamos National Laboratory (LANL)	High Selectivity and High Throughput Carbon Molecular Sieve Hollow Fiber Membrane based Modular Air Separation Unit for Producing High Purity O2	Rajinder P. Singh	
10:00 AM		AM BREAK															
		SESSION A5: Systems Analysis and Discussion				SESSION B5: Sensors				SESSION C5: Transformational REE Separation				SESSOIN D5: Air Separation/Oxygen Production Session II			
10:30 AM		National Energy Technology Laboratory (NETL)	Facilitated HPM Discussion	Briggs White	Vito Cedro	NanoSonic, Inc.	Wireless Networked Sensors in Water for Heavy Metal Detection	Hang Ruan	Jessica Mullen	Research Triangle Institute	Low Cost REE Recovery from Acid Mine Drainage Sludge	Zachary Hendren	Anthony Zinn	Pacific Northwest National Laboratory (PNNL)	Pressure Driven Oxygen Separation	David Reed	Venkat Venkataraman
11:00 AM		National Energy Technology Laboratory (NETL)	COE Sensitivity to Advanced Alloy Component Installed Costs	Eric Lewis		University of Alabama at Birmingham	Continuous Water Quality Sensing for Flue Gas Desulfurization (FGD) Wastewater	Lee Moradi		University of North Dakota	Economic Extraction and Recovery of REEs and Production of Clean Value- Added Products from Low-Rank Coal Fly Ash	Bruce Folkedahl		Pacific Northwest National Laboratory (PNNL)	Magnetocaloric Cryogenic System for High Efficiency Air Separations.	Jamie Holladay	
11:30 AM		National Energy Technology Laboratory (NETL)	Advanced Alloy Development - AUSC manufacturing cost analysis	Michael Verti		University of California - Los Angeles	Applying Anodic Stripping Voltammetry to Complex Wastewater Streams for Rapid Metal Detection	David Jassby		The Ohio State University	Concentrating Rare Earth Elements in Acid Mine Drainage Using Coal Combustion By-Products Through Abandoned Mine Land Reclamation	Chi Min Cheng		Pacific Northwest National Laboratory (PNNL)	Reliability and Durability Testing of Glass Ceramic Seals for Praxair's Oxygen Transport Membranes	David Reed	
NOON		LUNCH															
		SESSION A6: Materials Research				SESSION B6: Condensers				SESSION C6: Transformational REE Separation				SESSION D6: Reactor Engineering Design Session II			
1:00 PM		Oak Ridge National Laboratory (ORNL)	Creep-Fatigue-Oxidation Interactions: Predicting Alloy Lifetimes under Fossil Energy Service Conditions	Sebastien N. Dryepondt	Paul Jablonski	Advanced Cooling Tech.	A Novel Steam Condenser with Loop Thermosyphons and Firm-Forming Agents for Improved Heat Transfer Efficiency and Durability	Richard Bonner	Richard Dunst	University of Utah	Economic Extraction, Recovery, and Upgrading of Rare Earth Elements from Coal-Based Resources	Michael Free	Charles Miller	Oak Ridge National Laboratory (ORNL)	Experimental Validation of Coal Gasification with Neutron Imaging	James E. Parks, II	Steven Markovich
1:30 PM	Florida International University	The Novel Hybrid Start-off Model of High Performance Structural Alloys Design for Fossil Energy Power Plants	Yu Zhong	Interphase Materials, Inc.		Application of Heat Transfer Enhancement (HTE) System for Improved Efficiency of Power Plant Condensers	Kasey Catt	Wayne State University		Coupled Hydrothermal Extraction and Ligand-Associated Organosilica Media Recovery of REEs from Coal Fly Ash	Timothy Dittrich	University of Kentucky Research Foundation		Gasification Combined Heat and Power from Coal Fines	Heather Nikolic		
2:00 PM	National Energy Technology Laboratory (NETL)	Materials Performance in sCO2 power cycles	Omer Dogan	Oceanit		Advanced Anti-Fouling Coatings to Improve Coal-Fired Condenser Efficiency	Ken Cheung	Battelle Memorial Institute		Recovery of High Purity Rare Earth Elements (REEs) from Coal Ash via a Novel Electrowinning Process	Rick Peterson	University of Alaska Fairbanks		Making Coal Relevant for Small Scale Applications: Modular Gasification for Syngas/Engine CHP Applications in Challenging Environments	Brent Sheets		
2:30 PM	National Energy Technology Laboratory (NETL)	Fe-9Cr Steels with Increased Service Temperature Capability	Jeff Hawk	Virginia Polytechnic Institute and State University		Novel Patterned Surfaces for Improved Condenser Performance in Power Plants	Ranga Pitchumani	West Virginia University		At-source Recovery of Rare Earth Elements from Coal Mine Drainage	Paul Ziemkiewicz	Southern Research Institute		Small-Scale Engineered High Flexibility Gasifier	Santosh Gangwal		
3:00 PM	PM BREAK																
	SESSION A7: Materials Research				SESSION B7: Cooling and BEST				SESSION C7: Process Economics & Embedded REE Demand				SESSION D7: Reactor Engineering Design Session II				
3:30 PM	Pennsylvania State University	High Throughput Computational Framework of Materials Properties for Extreme Environments	Zi-Kui Liu	Karol Schrems	National Energy Technology Laboratory (NETL)	Dry and Hybrid Cooling System Analysis Activity at NETL	Eric Grol	Jessica Mullen	University of North Dakota–Energy & Environmental Research Center	Sampling, Characterization and Round Robin Analyses of Domestic U.S. Coal Based Resources Containing High Rare Earth Element (REE) Concentrations	Chris Zygarlicke	Anthony Zinn	University of Kentucky Research Foundation	Staged Opposed Multi Burner (OMB) for Modular Gasifier/Burner	Andrew Placido	Diane Revay Madden	
4:00 PM	Electric Power Research Institute, Inc	Characterization of Long-Term Service Coal Combustion Power Plant Enxetre Environment Materials (EEMs)	Steve Kung		Electric Power Research In	Phase II Field Demonstration at Plant Smith Generating Station Assessment of Opportunities for Optimal Reservoir Pressure Control, Plume Management and Produced Water Strategies	Robert Trautz		National Energy Technology Laboratory (NETL)	Rare Earth Elements (REE) from Coal and Coal By-Products - Techno-Economic & Embedded Demand Analysis	Morgan Summers		National Energy Technology Laboratory (NETL)	Advancements in Microwave-Assisted Catalysis	Mark Smith		
4:30 PM	Oak Ridge National Laboratory (ORNL)	Corrosion issues of EEMs in advanced coal fired boilers	Bruce Pint		University of North Dakota	Developing and Validating Pressure Management and Plume Control Strategies in the Williston Basin Through a Brine Extraction and Storage Test (BEST)	John Hamling										

Crosscutting Research  
AGENDA AT A GLANCE

	THURSDAY, APRIL 11	TRACK A: SENSORS AND CONTROLS CROSSCUTTING RESEARCH				TRACK B: MATERIALS AND DIRECT POWER EXTRACTION CROSSCUTTING RESEARCH				TRACK C: MATERIALS AND WATER MANAGEMENT CROSSCUTTING RESEARCH			
		SESSION A8: Monitoring and Controls				SESSION B8: Creep Fatigue				SESSION C8: Advanced Manufacturing			
		Organization	Title	Presenter	Moderator	Organization	Title	Presenter	Moderator	Organization	Title	Presenter	Moderator
8:00 AM		National Energy Technology Laboratory (NETL)	Advanced Sensors & Controls - Agent-based Controls and System Identification	David Tucker	Jessica Mullen	University of Texas at El Paso	A Guideline for the Assessment of Uniaxial Creep and Creep-Fatigue Data and Models	Md Abir Hossain	Vito Cedro	Oak Ridge National Laboratory (ORNL)	Demonstrate feasibility of additive manufacturing of high nickel alloys for FE components	Sebastien N. Dryepondt	Barbara Carney
8:30 AM		Georgia Tech Research Corporation	Real-Time Health Monitoring for Gas Turbine Components using Online Learning and High Dimensional Data	Benjamin Peters		QuesTek Innovations, LLC	Improved Models of Long-Term Creep Behavior of High Performance Structural Alloys for Existing and Advanced Technologies Fossil Energy Power Plants	Abhinav Saboo		Oak Ridge National Laboratory (ORNL)	Additive Manufacturing of High Gamma Prime Alloys	Sebastien N. Dryepondt	
9:00 AM		Georgia Tech Research Corporation	Expedited Real Time Processing for the NETL Hyper Cyber-Physical System	Jesus Arias		University of Texas at El Paso	An Accelerated Creep Testing Program for Advanced Creep Resistant Alloys for High Temperature Fossil Energy Applications	Jacob Pellicotte and Robert Mach		Lawrence Livermore National Laboratory	Additive Manufacturing of New Structures for Heat Exchange	Joshuah Stolaroff	
9:30 AM		National Energy Technology Laboratory (NETL)	Regulatory control of a 10 MWe supercritical CO2 recompression closed Brayton cycle	Eric Liese		Oak Ridge National Laboratory (ORNL)	Weldability of Creep Resistant Alloys for Advanced Power Plants	Zhili Feng		University of Texas at El Paso	Additive Manufacturing of Energy Harvesting Material System for Active Wireless Microelectro-mechanical Systems (MEMS) Sensors	Luis Chaves	
10:00 AM		AM BREAK											
		SESSION A9: Fiber Optic Sensors and Discussion				SESSION B9: Computational Modeling				SESSION C9: Water Management and Discussion			
10:30 AM		National Energy Technology Laboratory (NETL)	Facilitated Sensors & Controls Discussion	Briggs White	Richard Dunst	University of California - Riverside	Large-Scale, Graphics Processing Unit (GPU)-Enhanced Density Functional Tight Binding (DFTB) Approaches for Probing Multi-Component Alloys	Bryan Wong	Omer Bakshi	University of California	U.S.-China Clean Energy Research Center - Water and Energy Technologies	Ashok Rao	Maria Reidpath
11:00 AM		National Energy Technology Laboratory (NETL)	Advanced Sensors & Controls – Optical Fiber Sensors for Harsh Fossil Energy Environments	Paul Ohodnicki		Florida International University	The Fundamental Creep Behavior Model of GR.91 Alloy by Integrated Computational Materials Engineering (ICME) Approach	Jiuhua Chen		National Energy Technology Laboratory (NETL)	Powerplant, Status Update of Effluent Limitation Guideline – Regulations and Analysis Activity at NETL Effluents	Eric Grol	
11:30 AM		University of Pittsburgh	Engineering Metal Oxide Nanomaterials for Fiber Optical Sensor Platforms	Peng Chen		Michigan Technological University	Development of a Physically-Based Creep Model Incorporating ETA Phase Evolution for Nickel-Base Superalloys	Ninad Mohale		National Energy Technology Laboratory (NETL)	Facilitated Water Tech Discussion	Briggs White	
NOON		LUNCH											
		SESSION A10: Optical and Wireless Sensors				SESSION B10: Creep Fatigue and DPE Materials				SESSION C10: Membrane Water Treatment			
1:00 PM		University of Central Florida	In-Situ Optical Monitoring of Operating Gas Turbine Blade Coatings Under Extreme Environments	Seetha Raghavan	Sydni Credle	Missouri State University	Multi-modal Approach to Modeling Creep Deformation In Ni-Base Superalloys	Ridwan Sakidja	Barbara Carney	National Energy Technology Laboratory (NETL)	Water Management At Coal Power Systems	Nicolas Siefert	Omer Bakshi
1:30 PM		Carnegie Mellon University (CMU)	Low-Cost Efficient and Durable High Temperature Wireless Sensors by Direct Write Additive Manufacturing for Application in Fossil Energy Systems	Rahul Panet		Ohio State University	ICME for Creep of Ni-Base Superalloys in Advanced Ultra-Supercritical Steam Turbines	Stephen Niezgoda		University of Illinois at Urbana-Champaign	Energy Efficient Waste Heat Coupled Forward Osmosis for Effluent Water Management at Coal-Fired Power Plants	Nandakishore Rajagopalan	
2:00 PM		University of Connecticut (UConn)	Wireless 3D Nanorod Composite Arrays-Based High-Temperature Surface Acoustic Wave Sensors for Selective Gas Detection Through Machine Learning Algorithms	Yu Lei		University of Nebraska Lincoln	Vertically-Aligned Carbon-Nanotubes Embedded in Ceramic Matrices for Hot Electrode Applications	Yongfeng Lu		Los Alamos National Laboratory	Water Treatment and Water-Vapor Recovery Using Advanced Thermally Robust Membranes for Power Production	Rajinder Singh	
2:30 PM		West Virginia University	Passive Wireless Sensors Fabricated by Direct-Writing for Temperature and Health Monitoring of Energy Systems in Harsh-Environments	K S V Idahim and Daryl Reynolds		University of Texas at El Paso	Combustion Synthesis of Boride-Based Electrode Materials for Magneto Hydrodynamic (MHD) Direct Power Extraction	Gabriel Llausas		SRI International	Development of a High Efficient Membrane-Based Wastewater Management System for Thermal Power Plants	Indira Jayaweera	
3:00 PM		PM BREAK											
		SESSION A11: Wireless Sensors				SESSION B11: Direct Power Extraction (DPE)				SESSION C11: Wastewater			
3:30 PM	Siemens Corporation	Novel Temperature Sensors and Wireless Telemetry for Active Condition Monitoring of Advanced Gas Turbines	Anand Kulkarni	Sydni Credle	Florida International University	Novel High Temperature Carbide and Boride Ceramics for Direct Power Extraction Electrode Applications	Jose Belisario	Jason Hissam	University of New Mexico	Flue Gas Desulfurization Wastewater Treatment, Reuse and Recovery	Howe Thomson Stoll	Nicolas Siefert	
4:00 PM	University of Maine System	Technology Maturation of Wireless Harsh-Environment Sensors for Improved Conditioned-based Monitoring of Coal-Fired Power Generation	Mauricio Pereira da Cunha		National Energy Technology Laboratory (NETL)	Simulation & Validation of MHD flows and materials	Rigel Woodside		University of Kentucky Research Foundation	Intensified Flue Gas Desulfurization Water Treatment for Reuse, Solidification, and Discharge	Xin Gao		
4:30 PM	West Virginia University	High Temperature Gas Sensor for Coal Combustion System	Xingbo Liu		National Energy Technology Laboratory (NETL)	Overview of Direct Power Extraction Systems Engineering & Analyses	Nathan Weiland		West Virginia State University	Dev. Cost-Effective Biological Removal Technology for Selenium & Nitrate from Flue Gas Desulfurization Wastewater from Existing Power Generating Facility	Sanju Adagoor Sanjaya		