Record Nr. UNINA9910743368503321 Clean coal and sustainable energy: proceedings of the 9th international **Titolo** symposium on coal combustion / / edited by Junfu Lyu, Shuiging Li Pubbl/distr/stampa Singapore:,: Springer,, [2022] ©2022 **ISBN** 981-16-1656-6 981-16-1657-4 Descrizione fisica 1 online resource (1091 pages) Collana **Environmental Science and Engineering** Disciplina 411 Soggetti Clean coal technologies Coal - Combustion Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Nota di bibliografia Includes bibliographical references and index. Intro -- Preface -- Contents -- About the Editors -- Part I Invited Talks Nota di contenuto -- 1 Advances in Two-Fluid LES of Two-Phase Combustion -- 1.1

Introduction -- 1.2 Previous Studies on Two-Fluid LES of Two-Phase Combustion -- 1.3 Suggested Models for Two-Fluid LES of Two-Phase Combustion -- 1.4 The Two-Phase SGS Energy Equation Model -- 1.5 The SGS Mass Flux and Heat Flux Models -- 1.6 The SOM-SGS Gas Combustion Model -- 1.7 Assessment of the Two-Phase SGS Energy Equation Model -- 1.8 Assessment of the SOM Combustion Model --1.9 Assessment of the Two-Fluid RANS Modeling of Coal Combustion -- 1.10 Conclusions -- References -- 2 Flexible Operation of High Efficiency Coal Power Plants to Ensure Grid Stability When Intermittent Renewables Are Included -- 2.1 Introduction -- 2.2 Instrumentation and Control -- 2.3 Flexibility Options -- 2.4 Pollution Control Systems -- 2.5 Flexibility Impact Management -- 2.6 Conclusions -- References -- 3 Advances in Modeling Coal Pyrolysis, Char Combustion, and Soot Formation from Coal and Biomass Tar -- 3.1 Elemental Composition of Tar and Char -- 3.2 Soot Formation from Coal -- 3.3 Char Oxidation -- References -- 4 The Change in Bed Materials Size Distribution and Its Effect on CFB Boiler Operation -- 4.1 Introduction -- 4.2 The Initial Operation of the Once-Thought CFB Boiler of 330 MWe Unit #9 of Novocherkassk TPP -- 4.3 Model for Estimation of Changes

in the PSD of the Bed Material -- 4.4 Results and Discussion -- 4.5 Conclusions -- References -- 5 Insights of MILD Combustion from High-Fidelity Simulations -- 5.1 Introduction -- 5.2 Theoretical Formulation -- 5.2.1 Governing Equations for Coal Combustion Simulation -- 5.2.2 Mixture Fraction Based Models -- 5.2.3 Well-Stirred Reactor Models -- 5.3 Computational Configuration -- 5.4 Results and Discussion -- 5.4.1 Comparison of Mixture Fraction-Based Models.

5.4.2 Analysis of MILD Combustion Using Well-Stirred Reactor and Steady Flamelet Models -- 5.5 Conclusions -- References -- Part II Basic Coal Quality and Combustion -- 6 Study on Alkali Metal Migration Characteristics in the Pyrolysis of Naomaohu Coal in CO Atmosphere --6.1 Experimental Part -- 6.1.1 Experimental Sample -- 6.1.2 Experimental Setup and Steps -- 6.1.3 Determination of the Form and Content of Alkali Metals -- 6.2 Results and Discussion -- 6.2.1 Analysis of the Occurrence of Alkali Metals in Raw Coal -- 6.2.2 Migration Characteristics of Alkali Metals at Different Temperatures --6.3 Conclusion -- References -- 7 Precipitation Characteristics of Alkali/Alkaline Earth Metal in High Alkali Coal -- 7.1 Introduction --7.2 Experimental Approaches -- 7.2.1 Preparation of Coal Samples and Sample Properties -- 7.2.2 Experimental Equipment and Facilities -- 7.2.3 Experimental Approaches -- 7.3 Experimental Results and Discussion -- 7.3.1 Influence of AT on Ash Content -- 7.3.2 Alkali and Chlorine Contents in Coal Ash at Different AT -- 7.3.3 Alkaline Earth Metal Content in Coal Ash at Different AT -- 7.3.4 Comparation of XRF and ICP-OES Results -- 7.4 Conclusion -- References -- 8 Experimental Study on Removal of Low Concentration Coal Tar in Syngas by Mg-Ca Composite Catalyst -- 8.1 Introduction -- 8.2 Experimental -- 8.2.1 Experimental Apparatus -- 8.2.2 Experimental Materials -- 8.3 Results and Discussion -- 8.3.1 Effect of Temperature on Tar Conversion Rate and Gas Products -- 8.3.2 Effect of Catalyst Particle Size on Tar Conversion Rate and Gas Products -- 8.3.3 Effect of Reaction Time on Tar Conversion Rate and Gas Products -- 8.4 Conclusions -- References -- 9 Experimental Investigation on Sodium Migration and Mineral Transformation in Ash Deposit During Gasification of Zhundong Coal Using a Drop Tube Furnace -- 9.1 Introduction.

9.2 Experimental -- 9.3 Results and Discussion -- 9.3.1 Effects of Sodium Salts, Kaolin and Diatomite on Sodium Migration -- 9.3.2 Effect of Ash Deposition Time on Sodium Migration and Mineral Transformation -- 9.4 Conclusions -- References -- 10 Study on Characteristics and Influencing Factors of Coal-Water Slurry Pyrolysis -- 10.1 Introduction -- 10.2 Experiment -- 10.3 Experimental Results and Analysis -- 10.3.1 Effect of Temperature on Weight Loss Rate and Pyrolysis Gas Yield -- 10.3.2 Effect of Temperature on Combined Gas Volume Concentration -- 10.3.3 Effect of Temperature on Gas Yield and Volume Concentration --10.3.4 Effect of Heating Rate and Residence Time on Weight Loss Rate -- 10.4 Conclusion -- References -- 11 Soot Formation in High-Temperature Pyrolysis of Various Coals -- 11.1 Introduction -- 11.2 Experimental Section -- 11.2.1 Experimental Setups -- 11.2.2 Fuel Property -- 11.3 Results and Discussion -- 11.3.1 Soot Yield and Number Size Distribution -- 11.3.2 Gas Compositions -- 11.3.3 Soot Oxidization -- 11.4 Conclusions -- References -- 12 Effect of Microstructures on Char Combustion Reactivity -- 12.1 Introduction -- 12.2 Experimental -- 12.2.1 Coal Samples and Preparation of Char -- 12.2.2 Char Characterization -- 12.2.3 X-Ray Diffraction Analysis --12.2.4 Char Combustion Reactivity Measurement -- 12.3 Results

and Discussion -- 12.3.1 X-Ray Diffraction Carbon Crystallite Analyses -- 12.3.2 Char Combustion Reactivity -- 12.3.3 Correlations Between Char Combustion Reactivity and X-Ray Diffraction -- 12.4 Conclusions -- References -- 13 Effect of K2CO3 Addition on CO2 Gasification Characteristics and Ash Sintering Behaviour of a Chinese Lignite at Different Temperatures and Pressures as Examined Using a High-Pressure Thermogravimetric Analyser -- 13.1 Introduction -- 13.2 Experimental -- 13.2.1 Materials. 13.2.2 Experimental Setup -- 13.2.3 Data Processing and Analysis --13.2.4 SEM-EDS analysis -- 13.3 Results and Discussion -- 13.3.1 Gasification Characteristics -- 13.3.2 Ash Morphology -- 13.4 Conclusions -- References -- 14 Ash Deposition and Slagging Behavior of Xinjiang High-Alkali Coal in a 20MWth Cyclone Combustion Test Facility -- 14.1 Introduction -- 14.2 Experimental -- 14.2.1 Coal Properties -- 14.2.2 20MWth Pilot Plant Test Facility -- 14.3 Results and Discussion -- 14.3.1 Slagging Behavior of Ash During Cyclone Combustion Process -- 14.3.2 Ash Deposition Behavior in the Convective Zone of Furnace -- 14.3.3 Ash Slagging/Deposition Mechanism of Zhundong Coal Ash at Cyclone-Fired Condition -- 14.4 Conclusions -- References -- 15 Release Characteristics of Alkali Metals in Oxygen-Enriched Combustion of a Single Char Particle with Random Pore Model -- 15.1 Introduction -- 15.2 Physical Model -- 15.2.1 Random Pore Sub-model -- 15.2.2 Chemical Reaction Submodel -- 15.2.3 Diffusion Sub-model -- 15.2.4 Energy Sub-model --15.3 Model Validation -- 15.4 Alkali Metal Release in O2/N2 and O2/CO2 Atmospheres -- 15.5 Effects of Particle Size and Ambient Temperature -- 15.6 Effects of O2 Mole Fraction in O2/N2 and O2/CO2 Atmospheres -- 15.7 Conclusion -- References -- 16 Experimental Study on the Influence of Slagging and Fouling for Wall Temperature Distribution -- 16.1 Introduction -- 16.2 Experimental Setups and Methods -- 16.2.1 Experimental System and Setups -- 16.2.2 Clean Tube Wall Temperature -- 16.2.3 Stained Tube Wall Temperature -- 16.2.4 Influence Factors of Stained Tube Temperature Distribution -- 16.3 Results and Discussions -- 16.3.1 Circumferential Temperature Distribution of Clean Tube -- 16.3.2 Circumferential Temperature Distribution of Stained Tube -- 16.3.3 Influence Factors of Temperature Distribution of Stained Tube. 16.4 Conclusion -- References -- 17 Numerical Investigation of Fly Ash Deposition onto Tube Bundles Inside Coal-Fired Boilers -- 17.1 Introduction -- 17.2 Methodology -- 17.3 Results and Discussion --17.4 Conclusions -- References -- 18 Effect of Refractory Lining Thickness on Slag Layer Behavior in Cyclone Barrel -- 18.1 Introduction -- 18.2 The Modeled Cyclone Barrel -- 18.3 Numerical Models -- 18.4 Simulation Conditions -- 18.5 Results and Discussion -- 18.5.1 Temperature and Heat Flux -- 18.5.2 Thickness and Velocity -- 18.5.3 Outlet Temperature -- 18.6 Conclusions -- References -- 19 Characteristics of Alkali Metal Migration and Transformation During Pyrolysis of Naomaohu Coal -- 19.1 Introduction -- 19.2 Experimental System -- 19.3 Measurement of Alkali Metals (Na, K) -- 19.4 Results and Discussion -- 19.4.1 Effect Of Temperature And Atmosphere On Semi-Coke And Tar Yield -- 19.4.2 Effect of Temperature on the Occurrence Form and Residual Amount of Alkali Metal in Coal Char -- 19.4.3 Effect of Temperature on Distribution Characteristics of Alkali Metals -- 19.5 Conclusion -- References -- Part III Pulverized Coal Combustion -- 20 Numerical Investigation on Combustion Characteristics and NOx Emission of Double-Reheat Tower Boiler at Different Loads -- 20.1 Introduction -- 20.2 Boiler Description --20.3 Modeling Methodology -- 20.3.1 Grid Independence -- 20.3.2

Numerical Models -- 20.4 Results ad Discussion -- 20.4.1 Validation of the CFD simulation -- 20.4.2 Effects of Different Unit Loads on the Combustion Characteristics and NOx Emission -- 20.4.3 Effects of Different Excess Air Ratios on the Combustion Characteristics and NOx Emission -- 20.5 Conclusions -- References -- 21 Numerical Study on Influence of Platen Super-Heaters on Heat Deviation in a 600 MW Tangentially Fired Pulverized-Coal Boiler -- 21.1 Introduction.

21.2 Description of Boiler.