

1. Record Nr.	UNINA9910743384703321
Titolo	Advanced combustion for sustainable transport // Avinash Kumar Agarwal [and three others], editors
Pubbl/distr/stampa	Gateway East, Singapore : , : Springer, , [2022] ©2022
ISBN	981-16-8418-9 981-16-8417-0
Descrizione fisica	1 online resource (367 pages)
Collana	Energy, environment, and sustainability
Disciplina	621.4361
Soggetti	Diesel motor - Combustion Internal combustion engines - Combustion Sustainable transportation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Intro -- Preface -- Contents -- Editors and Contributors -- Part I General -- 1 Introduction to Advanced Combustion for Sustainable Transport -- References -- Part II Advanced Combustion Technologies for CI Engines -- 2 Strategical Evolution of Clean Diesel Combustion -- 2.1 Introduction -- 2.1.1 Future of Diesel Engine -- 2.1.2 CDC and LTC -- 2.2 Practical Limit of the Efficiency -- 2.2.1 Constraints for Optimisation -- 2.2.2 Heat Loss -- 2.3 Mechanisms of Pollutant Formation -- 2.3.1 Soot Formation -- 2.3.2 CO and UHC Formation -- 2.4 Strategic Evolution of CDC -- 2.4.1 Injection Strategies -- 2.4.2 Swirl and Intake Geometry -- 2.4.3 Piston Bowl Geometry -- 2.5 Future Research Directions -- 2.5.1 Thermal Aspects -- 2.5.2 Interdisciplinary Aspects -- 2.6 Summary -- References -- 3 Multi-mode Low Temperature Combustion (LTC) and Mode Switching Control -- 3.1 Introduction -- 3.1.1 Limitations of LTC Operation -- 3.1.2 Benefits of Multi-mode Operation -- 3.1.3 Optimal Control of Multi-mode LTC Engine -- 3.2 Controlled Variables -- 3.2.1 Combustion Phasing -- 3.2.2 Engine Load -- 3.2.3 Exhaust Gas Temperature -- 3.2.4 Maximum Pressure Rise Rate -- 3.2.5 Engine-Out Emissions -- 3.2.6 COVimep -- 3.3 Control Actuators -- 3.3.1 Variable Valve Actuation --

3.3.2 Fuel Injection System -- 3.3.3 Fast Thermal Management (FTM) -- 3.3.4 Exhaust Gas Recirculation (EGR) -- 3.3.5 Intake Air Pressure Boosting System -- 3.4 LTC Control -- 3.4.1 Model-Free Closed-Loop Control Systems -- 3.4.2 Model-Based Closed-Loop Control Systems -- 3.4.3 HCCI Control -- 3.4.4 PPCI Control -- 3.4.5 RCCI Control -- 3.5 Mode Switching Control -- 3.5.1 SI-HCCI-SI Mode Switching -- 3.5.2 HCCI-ASSCI-SI Mode Switching -- 3.5.3 HCCI-PPCI Mode Switching -- 3.5.4 CDC-PPCI Mode Switching -- 3.6 CDC-RCCI Mode Switching -- 3.7 RCCI-CDF Mode Switching -- 3.8 Summary -- References.

4 State of the Art in Low-Temperature Combustion Technologies: HCCI, PPCI, and RCCI -- 4.1 Introduction -- 4.1.1 Single Fuelled and Dual Fuelled Advance Combustion Technique -- 4.2 Strategies to Develop Low-Temperature Combustion Technology -- 4.2.1 Homogeneous Charge Compression Ignition Combustion (HCCI) -- 4.2.2 Premixed Charge Compression Ignition Combustion (PPCI) -- 4.2.3 Reactivity Controlled Compression Ignition (RCCI) -- 4.3 Concluding Remarks -- 4.4 Declaration of Competing Interest -- References -- 5 Combustion in Diesel Fuelled Partially Premixed Compression Ignition Engines -- 5.1 Introduction -- 5.2 Conventional Diesel Jet Combustion Model -- 5.3 Chemical Kinetics -- 5.4 Planar Laser-Induced Fluorescence (PLIF) -- 5.5 First Stage Ignition -- 5.6 Second Stage Ignition -- 5.7 Summary and Way Forward -- References -- 6 Gasoline Compression Ignition Combustion Strategies and Recent Engine System Developments for Commercial and Passenger Transport Applications -- 6.1 Introduction -- 6.2 Gasoline Autoignition Behavior -- 6.3 Gasoline Spray Characteristics -- 6.4 Overview of GCI Combustion Strategies -- 6.4.1 Homogeneous or Lightly-Stratified GCI (HCCI) -- 6.4.2 Partially-Premixed GCI (PPCI) -- 6.4.3 Mixing-Controlled GCI (MCCI) -- 6.5 Recent System-Level Developments of GCI Engines -- 6.5.1 15 L Heavy-Duty GCI Engine for Meeting 0.02 g/hp-Hr Tailpipe NO<sub>x</sub> -- 6.5.2 2.2 L Gasoline Direct Injection Compression Ignition Engine -- 6.5.3 1.4 L Mixed-Mode Gasoline Low Temperature Combustion Engine -- 6.5.4 2 L Mazda Skyactiv-X Gasoline Engine -- 6.5.5 Technology Outlook for GCI -- 6.6 Summary -- References -- Part III Advanced Combustion Technologies for SI Engines -- 7 Optical Diagnostics for Gasoline Direct Injection Engines -- 7.1 Introduction -- 7.2 Optical Diagnostics in GDI Engines -- 7.2.1 In-cylinder Spray Characterization. -- 7.2.2 In-cylinder Flows and Spray-Flow Interactions -- 7.2.3 Fuel-Air Mixture Formation -- 7.2.4 Flame Evolution and Pollutant Formation -- 7.3 Summary and Way-Forward -- References -- Part IV Dual-Fuel Combustion Technology -- 8 Dual-Fuel Internal Combustion Engines for Sustainable Transport Fuels -- 8.1 Introduction -- 8.2 Different Biofuels and Their Blends for Transportation -- 8.2.1 Dual Fuel System -- 8.2.2 Biomethane CNG Hybrid -- 8.3 Biogas-Biodiesel Fuel Mix for SI Engines -- 8.3.1 Potential Single Fuel Systems that Can Be Blended and Their Characteristics -- 8.3.2 Dual Fuel Blending Techniques: Methods of Preparation, Homogenization and Their Selection Criteria -- 8.3.3 Conditions for Maximizing the Combustion Potentials of Dual Fuels in ICEs -- 8.3.4 Factors Effecting Dual Fuel Characteristics in SI Engines -- 8.3.5 Dual Fuel Systems and Engine Life -- 8.3.6 Current Trends in the Use of Biofuels as High-Performance Engine Fuels -- 8.4 Future Prospects of Dual-Fuel System as an Alternative Fuel -- 8.5 Sustainable Technologies for Alternative Fuels and Future Challenges -- 8.5.1 Sustainable Technologies -- 8.5.2 Current Challenges and Future Trends -- 8.6 Conclusion -- References -- 9 Compressed Natural Gas Utilization in Dual-Fuel Internal Combustion Engines -- 9.1 Introduction -- 9.2 Natural Gas -- 9.3

Dual-Fuel Engines -- 9.4 CNG-Diesel Dual-Fuel Engines -- 9.5 CNG-Gasoline Dual-Fuel Engine -- 9.6 Summary and Way-Forward -- References -- Part V Miscellaneous -- 10 Analysis of the Potential Metal Hydrides for Hydrogen Storage in Automobile Applications -- 10.1 Introduction -- 10.2 Physisorption-Based Hydrogen Storage -- 10.2.1 Metal Organic Frameworks (MOFs) -- 10.2.2 Porous Carbons -- 10.2.3 Zeolites -- 10.3 Chemisorption-Based Hydrogen Storage -- 10.3.1 Complex Metal Hydrides -- 10.3.2 Metal Hydrides -- 10.4 Metal Hydride Properties. 10.4.1 Metal Hydrides Available -- 10.4.2 Equilibrium Pressure for Metal Hydrides -- 10.4.3 Thermal Modelling of Metal Hydrides -- 10.5 Requirements of Metal Hydrides for On-Board Applications -- 10.5.1 Achieving the Required Pressure -- 10.5.2 Achieving the Required Heat Transfer -- 10.5.3 Mass and Volume Considerations -- 10.5.4 Recyclability of Metal Hydrides for Many Cycles -- 10.6 Conclusion -- References -- 11 Waste Heat Recovery Potential from Internal Combustion Engines Using Organic Rankine Cycle -- 11.1 Introduction -- 11.1.1 WHR System Evolution and Trends -- 11.1.2 Current State-of-the-Art of the ORC Systems -- 11.2 Fundamentals of Organic Rankine Cycle (ORC) -- 11.2.1 Thermodynamic Analysis of the ORC System -- 11.2.2 ORC System Components -- 11.2.3 Working Fluids for ORC Systems -- 11.3 Economic Analysis of the ORC Systems -- 11.4 WHR System for ICEs: Advantages and Challenges -- 11.5 Future Directions in WHR Technologies -- References.

---