

Preface

This volume, the reader is holding in his hands or reading via online journal access is a diversified collection of the papers presented by a number of internationally distinguished academic scholars and talented industrial researchers. Every paper represents an independent effort of a single author or a team, however, all of them are about securing our energy future and making our planet "cleaner and greener".

Technology developers lately turned into employing the oxygen or oxygen enhancement techniques for significant improvement of the energy conversion processes. It is known that employing oxygen provides a lot of energy saving and environmental benefits for industrial processes. Innovative "Zero Emission Technologies" studied by Gorski and Yantovsky could deliver a viable alternative for increasing energy efficiency and reducing GHG emissions.

An interesting topic is presented by Nosach and Shraiber in the series of three subsequent papers — thermochemical reforming of natural gas in the flow of combustion products for power generation. The proposed schemes allow significant improvement of the variety of power plants efficiency and GHG emission reduction.

New combustion systems and burners development attract many scientists and engineers all over the world to more efficient and cleaner burning of fossil fuels. In that increasing effort the research community nowadays focuses on innovative combustion concepts and techniques, new materials development and use, as well as post-combustion controls of GHG emissions mitigation. The numerical and experimental works presented by Viskanta and Alterdorfner *et al.* are devoted to inert porous media for advanced combustion devices. Soroka presented an extensive development work on a flat-flame burner for industrial applications, while Borissov and Shtern discussed the specific details of the advanced vortex combustor.

World industry starts actively implementing innovative approaches to using the opportunity fuels such as hot exhaust from a variety of industrial processes, syngas from the solid fuels gasification, as well as biomass fuels such as agricultural residues. Carvalho *et al.* discuss the main challenges in small-scale combustion of agricultural biomass fuels in the countries of the European Union. An unique method of advanced indirect evaporative cooling is discussed by Gillan. The method was extensively and independently studied by a number of interna-

tional research organizations concluding significant reduction in electric demands for a wide spectrum of cooling applications. Air conditioners recently manufactured based on this method do not use any refrigerants and reduce energy consumption as opposed to traditional refrigerant-based vapor compression systems.

Several papers of this volume discuss and review numerical, experimental and field test methodology (C.Salvador *et al.*, I Fedchenia *et al.*, G. Scheffknecht) — all are very important for the research performance and results analysis in the energy conservation and GHG emission mitigation area.

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