

Editorial

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According to World Coal Institute, “*It is not use of coal, but how coal is used that must be the focus of action*”. It gives me immense pleasure to write the editorial of an emergent journal in a most vital area like coal science and technology. Coal, the world’s most abundant fossil fuel, can provide world’s energy needs for the next several decades. The special issue of International Journal of Coal Science and Technology (JCST) on “Indian coal” mainly aims at bringing out the current research activities in India for gainful utilization of the coal resources leading to societal development. I express my sincere gratitude to Prof. Suping Peng and his team for agreeing to publish the issue with my guest editorship.

India is one of the most important coal producers and consumers in the world. India has a vast energy infrastructure of coal, starting from coal mining to extraction to coal transport and on to coal utilization in power plants. The JCST special issue on Indian coal will be of great importance as a compilation of some of the important R&D aspects of Indian coals in recent years. India is the world’s fourth largest coal producing country. Coal India Limited (CIL) is the country’s largest coal company. There are eight coal producing companies wholly owned by CIL. The country continues to significantly rely on coal for power generation, and this abundant and affordable fossil fuel accounts for about 70 % of the country’s electricity output. In India, coal can generally be found in two main geological horizons: Gondwana sediments (Permian) and early Tertiary sediments (Eocene). The majority of the deposits

belong to the first category and are located in the eastern and south-eastern part of the country, specifically in Andhra Pradesh, Assam and Bihar (even though in these two regions only in very small quantities), Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, Sikkim, Uttar Pradesh, and West Bengal. The Tertiary coalfields are mainly located in Arunachal Pradesh, Assam, Meghalaya, Nagaland, and other northeast regions. Finally, lignite resources can be found in Tamil Nadu, Gujarat, Rajasthan, Jammu, Kashmir, and Pondicherry.

The Indian coal is of low-quality due to the high ash contents. Coking coal accounts for around 18 %–20 %, of which only a small percentage is of prime coking quality. Prime coking coal can be found especially in the Jharia coalfield in Jharkhand state. Indian coal also has particularly high moisture content, while sulphur content and calorific values are low. However, Tertiary coals in India contain medium to high sulphur. Thus, clean coal initiatives have been started in India to make Indian coal clean for sustainable and gainful utilization. Clean coal initiatives in India are mainly categorized into: (i) Coal characterization and beneficiation, (ii) Coal combustion, (iii) Coal conversion, and (iv) Post-combustion technologies.

The aim of this special issue on “Indian Coal” is to compile some of the significant outstanding research activities carried out in India on different aspects of science and technology of Indian coals. The publication of this special issue is also intended to contribute to the debate by examining the coal energy research and policies settings that will influence the outlook for India’s coal industry and highlight the role of Indian coal in improving energy access in the country and world in general.

In India, the government as well as private industries are now more serious about the science behind coal, the science that drives our coal-energy industry. Indian scientists

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and other researchers have been conducting leading-edge research with state-of-the art facilities in first-rate research agencies, universities, and tertiary institutions. The Council of Scientific and Industrial Research (CSIR) is one of the leading organizations working in the field of clean coal technology in India. However, there is a need for enhanced coal R&D strength in India for significant competitive strength with the rest of World.

In this issue, a good numbers of articles in different areas of coal sciences have been selected for publication. The special issue reflects the multi-directional research work among the coal researchers in India. However, coal preparation, coal beneficiation, and geochemical aspects are major areas of research in India. Coal mineralogy and related environmental issues are also prime areas of research in the country. The institutions such as CSIR, Banaras Hindu University, National Institute of Technology, Indian Institute of Technology, and the Indian School of Mines are main locations of Indian coal research.

This special issue covers some of the very essential topic of coal research including advanced coal characterization, distribution and transformation behaviour of mineral species in coal seams, application of pneumatic separators in coal beneficiation, coal mining and environmental issues, geochemistry and petrology of coals, life cycle assessment of coal-fired power stations, biological leaching of coals, column flotation of non-coking coal, fabrication and application of membranes in the process for coke production, grinding analysis of coal, carbon sequestration in reclaimed coal mine, etc. The articles in the issue demonstrate the progress towards making Indian coal an environmentally acceptable fuel for energy production. Thus, it is felt that the issue will give an impression of the science of Indian coals to the overseas researchers in this field.

In summary, there are plenty of opportunities in exploration and exploitation of Indian coal towards achieving clean coal technology leading to the economic growth.

Coal beneficiation enables value addition in low-grade coal, mainly by reducing the unwanted substance like ash content, sulfur etc. Although a good number of studies have been performed in the beneficiation of low-grade Indian coals, more advanced and eco-friendly efforts have to be made. Advanced Clean Coal Technology (CCT) for improvement in non-coking coal to coke, coal utilization efficiencies, underground coal gasification, methane extraction from coal bed and mines, and CO₂ sequestration are to be pursued in mission mode project. Some of the advanced CCTs are: Combined Cycle Technologies, Underground Coal Gasification, Coal Bed Methane, Molten Carbonate Fuel Cell, Magneto Hydro Dynamics, Advanced Combustion Technologies, and Carbon Capture and Storage. However, Indian coal research needs to enlist public/private partnerships to make these mission-mode projects more successful and innovative. There are financial, infrastructural, and regulatory barriers to be tackled in almost entire coal research from coal extraction to coal utilization and pollution abatement.

At last, I would like to express my appreciation to some of my friends, colleagues, collaborators, students and well-wishes who offered me constant inspiration, motivation, and support during my play with “COAL”. They include Dr. D Ramaiah, Dr. Jim Hower, Prof. Shifeng Dai, Prof. Colin Ward, Dr. Luis F Silva, Prof. Fran Waanders, Dr. Bimala P Baruah, Dr. P Sengupta, Dr. Rajani K Boruah, Dr. S K Biswal, Mr. Tonkeswar Das, my Students/Research Fellows, and all the Well-wishers in CSIR-NEIST.

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