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Editorial

Special Issue on "Green Technologies for Production Processes"

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1. Introduction

Numerous pathways and narratives have been developed to shed light on how society could transform its production systems in line with the aspirational targets of the Paris Agreement and Sustainable Development Goals. Green technologies, as an emerging technical innovation, are necessary for driving the production system transformation that is called for global sustainability. Key potential benefits of green technology are that they might substantially reduce the cost of mitigating CO_2 emissions and improve the environment performance with the development of more affordable, better-performing technologies.

The scope of the *Processes* journal covers research in chemistry, biology, materials, and allied engineering fields. Thus, in this Special Issue, we invite articles focused on research regarding the chemistry, biology, materials, and allied engineering firms (manufacturing processes, iron and steel production processes, mining processes, power generation processes, and so on).

This Special Issue on "Green Technologies for Production Processes" will focus on publishing original research works about Green Technologies for Production Processes, including discrete production processes and process production processes, from various aspects that tackle product, process, and system issues in production. The aim is to report the state-of-the-art on relevant research topics and highlight the barriers, challenges, and opportunities we are facing. It also welcomes studies that stimulate research discussion of moving towards production in a particular industrial sector. Topics of interest for this Special Issue include but are not limited to:

(1) Energy saving and waste reduction in production processes;
(2) Production of new and renewable energy devices;
(3) Design and manufacturing of green products;
(4) Low carbon manufacturing and remanufacturing;
(5) Materials for green production;
(6) Management and policy for sustainable production;
(7) Technologies of mitigating CO_2 emissions;
(8) Other green technologies.

2. Industry Development Issues

Zhang et al. [1] propose a model framework that uses the fuzzy decision-making test and evaluation laboratory (fuzzy DEMATEL) method to analyze the drivers of corporate environmental responsibility (CER) from the perspective of the triple bottom line (TBL) of economy, environment, and society. The results show that some effective measures to implement CER can be provided for the government, the automobile manufacturing industry,

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and the public to promote sustainable development of the Chinese Auto Manufacturing Industry (CAMI). Zhang et al. [2] propose a multicriteria decision-making (MCDM) method considering the circular economy in order to select the best reverse logistics provider for remanufacturing. In this article, a circularity dimension is included in the evaluation criteria. Then, analytic hierarchy process (AHP) is used to calculate the global weights of each criterion, which are used as the parameters in selecting RL providers. Finally, technique for order of preference by similarity to ideal solution (TOPSIS) is applied to rank reverse logistics providers with three different modes. Wang et al. [3] construct a sustainability evaluation method of logistics parks based on energy; analyze the input (energy, land, investment, equipment, information technology, and human resources) and output (income and waste) of logistics parks from the perspective of energy; study the characteristics of the emergy flow of logistics parks; and construct the function, structure, ecological efficiency, and sustainable development indexes of logistics parks. The results reveal the internal relationship among economic, environmental, and social benefits of logistics parks through emergy and provides theoretical and methodological support for the sustainable development of logistics parks. Zhang et al. [4] present a literature review on reverse logistics (RL) supplier selection in terms of criteria and methods and propose a three-stage typology of decision-making frameworks to understanding RL supplier selection. The results show that reverse logistics (RL) is closely related to remanufacturing and could have a profound impact on the remanufacturing industry. Ivascu [5] proposes a hierarchical framework for sustainability assessment of manufacturing industry in Romania. This hierarchical framework can be customized in detail for the specific of each organization and can be adapted in other industries, including banking, retail, and other services. It can be observed that waste management and the interests of the stakeholders are major implications that must be measured and properly motivated.

3. New Energy Issues

Wu et al. [6] construct a forecasting model based on a correlation test, the cuckoo search optimization (CSO) algorithm and extreme learning machine (ELM) method in order to forecast and analyze the developing potential of electric power substitution. The results showed that the CSO-ELM model has great forecasting accuracy. Bu and Zhang [7] propose a data-driven prospect analysis framework to evaluate the activated potential under two kinds of nearby accommodation approaches and to explore the completion prospect of this new obligated quota from provincial levels. They analyze two accommodation approach of the pathway for the former is to activate more provincial accommodation potential either via releasing system flexibility or by substituting generation right, and the pathway for the latter is to introduce trans-regional or trans-provincial accommodation and import more renewable energy power. Li et al. [8] present the current development status and GHG (greenhouse gas) mitigation effect of the straw-based biomass power plants in Anhui Province in China. They consider that the large-scale development of biomass power plants remains a challenge for the future, especially in areas of AHP with a low biomass density.

4. Process Design Issues

Lu et al. [9] propose an all-factors analysis approach on energy consumption in the blast furnace iron making process (BFIMP). The results show that the improvement of some material flows, energy flows, and operation parameters could increase the amount of the pulverized coal injection ratio (PCIR), such as sinter size, ore grade, sinter grade, M10, blast volume, blast temperature, and especially for sinter alkalinity. Zhang et al. [10] address a coincineration scheme for mixing multi-component wastes in a rotary kiln for waste disposal from pesticide production. Their results show that the rotary kiln incineration and flue gas treatment processes were successfully applied in engineering for green production of pesticides. In order to achieve carbon efficiency improvement and save costs, Hu et al. [11] establish a carbon emission and processing cost models of the grinding process. Considering the constraints of machine tool equipment performance and

processing quality requirements, the grinding wheel's linear velocity, cutting feed rate, and the rotation speed of the workpiece were selected as the optimization variables, and the improved NSGA-II algorithm was applied to solve the optimization model. Considering that the process parameters of hot stamping considerably influence the product forming quality and energy consumption, Gao et al. [12] introduce the energy-economizing indices of hot stamping with multiobjective consideration of energy consumption and product forming quality to find a pathway by which to obtain optimal hot stamping process parameters. The obtained results may be used for guiding process optimization regarding energy saving and the method of manufacturing parameters selection. Hu et al. [13] based on the basic theory of fluid–solid coupling, the correlation definition between coal porosity and permeability, and previous studies on the influence of adsorption expansion, change in pore free gas pressure, and the Klinkenberg effect on gas flow in coal derive a mathematical model of the dynamic evolution of coal permeability and porosity. Numerical simulation results show that the solution can effectively guide gas extraction and discharge during mining.

5. Scheduling and Planning Issues

Considering carbon emissions, Sun et al. [14] establish a multiobjective flexible job shop scheduling problem (MO-FJSP) mathematical model with minimum completion time, carbon emission, and machine load. To solve this problem, they study six variants of the non-dominated sorting genetic algorithm-III (NSGA-III) and from the experimental results, it can be concluded that the NSGAIII-COE has significant advantages in solving the low carbon MO-FJSP. Sun et al. [15] establish a multiprocess route scheduling optimization model with carbon emissions and cost as the multiobjective in order to solve the problems of flexible process route and workshop scheduling scheme changes frequently in the multivariety small batch production mode. The optimization results under single-target and multitarget conditions are contrasted and analyzed, to guide enterprises to choose a reasonable scheduling plan, improve the carbon efficiency of the production line, and save costs. Fu et al. [16] focus on an optimal schedule for a micro energy grid considering the maximum total carbon emission allowance (MTEA). The results show that: (1) a micro energy grid can make the most use of the complementary characters of different energy sources to meet different energy demands for electricity, heat, cold, and gas; (2) the risk aversion scheduling model can represent the influence of uncertainty variables in objective functions and constraints, and provide a basis for decision makers who have different attitudes; and (3) demand response (DR) can smooth the energy load curves. Liu et al. [17] promotes a bilevel optimization planning approach for photovoltaic (PV)-storage charging stations. The results show that the proposed bilevel optimization model can provide a more economical and reasonable planning scheme than the single-level model, and can reduce the investment cost by 8.84%, operation and maintenance cost by 13.23%, and increase net revenue by 5.11%.

6. Other Issues

These are some accepted papers in the Special Issue "Green Technologies for Production Processes", besides the industry development issues, new energy issues, process design issues, and scheduling and planning issues. Huynh et al. [18] describes a green and facile method for the preparation of multibranched gold nanoparticles using hydroquinone as a reducing agent and chitosan as a stabilizer, through ultrasound irradiation to improve the multibranched shape and stability. To provide guidance towards reducing the weight of the HFC-125 storage vessel by reducing the release pressure and to reveal the effects of release pressure on the extinguishing efficiency of HFC-125, Jin et al. [19] investigate the flow and diffusion characteristics of HFC-125 under six release pressures in the present study. Results show that the degree of superheat and the injection duration both decreased with the release pressure. Lin et al. [20] analyze the factors that affect the implementation of intelligent systems in motor production lines. Their research results can be provided

as a reference for production lines that acquaint with intelligent systems. Liang et al. [21] use data envelopment analysis (DEA) to analyze the production process efficiency and the effective use of input elements of greenhouse vegetables at the provincial level in China. The results reveal that many chemical fertilizers, farmyard manure, and pesticides in China are inefficient. Xia et al. [22] based on the authorized remanufacturing, construct the game model between a manufacturer and a remanufacturer. The main results are as follows: the OEM could increase its profit and change its unfavorable market competition status by authorizing remanufacturing; a franchise contract could make the sustainability supply chain optimized; when the ratio of the environment effect is greater than a certain threshold, centralized decision-making could not only increase the supply chain revenue, but also reduce the impact on the environment.

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