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Editorial

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Editorial: A new stage of *Emerging Materials Research* – challenges and opportunities

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This Editorial is a great opportunity for Dr Hongbo Gu and Dr Frédéric Heim to introduce ourselves as current editors in chief of *Emerging Materials Research* for the coming year. Frédéric Heim is a full professor at Université de Haute Alsace/ENSISA in Mulhouse (France), where he heads the textile department at the College of Engineering. He is also the director of the Laboratory for Textile Physics and Mechanics there. His research activities focus mainly on textile biomaterials. Hongbo Gu is an associate professor at Tongji University in China. Her research interests focus on multifunctional polymer nanocomposites for the environmental remediation and electronic devices.

The journal of *Emerging Materials Research* aims to feature and spread the impact of research on materials science and engineering, covering their manufacturing, processing, structures, properties and performances. It is of course an honor for both of us to engage ourselves in bringing the journal forward. The journal will continue to publish new knowledge and discoveries in the field of materials science and engineering. We will encourage all scientific work done in emerging fields such as artificial intelligence, flexible electronics, medical materials, energy storage and environmental issues. The challenge is to always increase the quality of the published papers in order to make the journal (which is still young) more and more recognized in the future. With the development of new emerging materials, the journal offers the opportunity to report latest results in this field and we hope more scientists will be involved in our publications in the future. In particular, we would like to encourage young scientists to provide their insights, opinions and experiences through the submission of papers in the journal. Our goal will always be to consider the diversity and multidisciplinary of research.

The current issue, which has multidisciplinary content, focuses on optimizing processes in general; however, with a specific focus on energy saving, storing or producing, which are very current concerns that research must deal with. The first paper by Mallick *et al.*[1] reports the structural, electrical and thermistor behavior of $BiFeO_3$–$PbZrO_3$ prepared with the solid-state reaction technique for energy storage devices. Particularly, they discussed the performance of as-prepared materials as a negative-temperature-coefficient thermistor in the temperature range 300–450°C.

Since the studies on the resistance spot welding (RSW) joints of aluminum (Al) alloys containing scandium (Sc) is rare, the second paper[2] studies the microstructure and mechanical properties of RSW joints of 7075T-6 containing scandium. The results show that the introduction of scandium could significantly increase the tensile shear strength of welded joints.

In order to solve the trade-off phenomenon between permeability and selectivity of performance for polymeric membrane for hydrogen separation, the mixed conductors such as $BaCe_{0.9}Y_{0.1}O_{3-\delta}$ and $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-\delta}$ with less agglomeration effect have been selected as fillers for polyetherimide membrane in the paper by Alqaheem and Alhindi[3].

The next paper[4] conducts a static analysis of an E-glass-reinforced isophthalic polyester composite and an E-glass-reinforced general-purpose or orthophthalic polyester composite motivated by the distinct properties such as a high strength-to-weight ratio, high corrosion resistance, a high modulus-to-weight ratio and wear resistance of composites materials. The authors believe that their composites can be potentially used in marine applications, particularly the hull frame or body of the boat.

In the fifth paper[5], Srivastava *et al.* design a new lead-free perovskite solar cell structure consisting of zinc selenide (ZnSe) as the electron transport layer, $CsSn_{0.5}Ge_{0.5}I_3$ as the perovskite absorber layer and poly[bis(4-phenyl)(2,4,6-trimethylphenyl) amine] as the hole transport layer. The results demonstrate that it's essential for the selection of best material and easy fabrication process in the development of highly efficient and environmentally friendly perovskite solar cells.

Next, Nigam *et al.*[6] talk about the image-driven deep-learning (DL)-enabled automatic microstructural recognition, in which the microstructure could be automatedly recognized and classified to identify dendritic characteristics in metallic microstructures by the DL method comprised of a convolutional neural network. This work is beneficial for the reduction of dependency on skilled and experienced researchers and expedition of the material development cycle.

The way to obtain complex 316L parts from selected laser melting is investigated in the paper by Chen *et al.*[7] Focus is brought on the effect of the input laser density on the performances of the obtained parts and how these performances a correlated to the microstructure. The approach helps defining how to improve the structure and the related mechanical performances.

In the next paper,[8] the authors present a calculation model that helps predict results regarding ethanol gas sensing of pristine and copper (Cu)-doped zinc oxide (ZnO) at room temperature. The model is in correlation with the experimental trend. Such models can be transposed to other gas-sensing processes and can be useful for further response and recovery time calculations.

Kumar *et al*.[9] provide an interesting insight in how to optimize the use of TiAlN coatings in order to increase the wear resistance of tools. For that purpose, the effect of several tribological testing conditions such as load, sliding velocity or sliding distance is studied on TiAlN-coated MDC-K tool steel.

The next paper[10] studies the potential of novel photoelectrodes obtained from hetero-structures made from polyaniline, copper and silicon. These structures are interesting candidates to be used as photocathodes for photoelectrochemical reduction of carbon dioxide (CO_2) to methanol (CH_3OH). Results show that it is possible to increase the photocatalytic reduction by adjusting the material components.

Finally, in the last paper in this issue, Umar *et al*.[11] investigate in silico the potential of a novel absorber material for perovskite solar cell, expected to replace lead, for which toxicity and stability are major concerns. Results bring out that appropriate acceptor density, thickness and defect density allows to obtain improved efficiency of the solar cell.

We hope you'll enjoy the content of this issue and that you'll find the scientific and technical information that you need to make your research go forward.

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