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Editorial: Recent advances in functional materials: polymers and composite materials

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Editorial on the Research Topic
Recent advances in functional materials: polymers and composite materials

Advanced polymeric and composite materials have many applications in different fields of nanoscience and technology. These applications include photocatalysis, energy storage, energy harvesting, electronics, telecommunications, biomedicine, pharmaceutical and 3D printing technologies. A spectrum of research and review articles underscores the recent developments and potential applications of composite materials. The main objective of the special section on the Research Topic "*Recent Advances in Functional Materials: Polymers and Composite Materials*" was to cover and highlight the recent advances in functional materials with a focus on polymers and composite materials. In this Research Topic, five research papers are published, illuminating the cutting-edge advances and applications of polymeric and composite materials.

The first paper by Ali et al. demonstrates the photocatalytic activity response of g-C_3N_4, Fe_3O_4 and g-C_3N_4/Fe_3O_4 nanocomposites. The g-C_3N_4/Fe_3O_4 nanocomposites exhibit pronounced photocatalytic efficiency against methylene blue dye, marking them as suitable nanocomposites for photo-absorbers and photocatalysts under visible light. Huang et al. highlight the high-temperature hazards of asphalt pavement. This study suggests that a multifunctional composite coating can be utilized for the surface layer of asphalt pavement to achieve cooling and exhaust gas degradation simultaneously. This study is beneficial to overcome the environmental pollution caused by automobile exhaust. Titanium dioxide (TiO_2) being a refractive and good photocatalytic material is proposed for use in the preparation of functional composite coating. The use of rutile TiO_2 and carbon black (as pigments and fillers) has been proposed to overcome the hazards of high-temperature asphalt pavement and pollution from automobile exhaust. Another article by Huang et al. also reports the scheme of pavement layer combination with phase

change materials. By adopting this approach in the design of road structures, it is possible to mitigate road temperatures.

Emphasizing the advancement in polymeric materials for 3D printing technologies, Păcurar et al. have used high-performance and low-cost polymeric materials (such as PEKK, PET-G and MED 857) in designing robotic systems (such as grippers) for biomechatronic applications. An article by Scazzoli et al. presents a 3-point bending flexural test to determine the self-healing capability of conventional fiber-reinforced polymers to detect any damage or microcracks in the polymer matrix. A 3-point bending flexural testing method is proposed to be a fast and reliable method which allows the detection of composite damage at an early stage. This research can be beneficial for the automotive, aerospace, wind, marine and sports industries, where fiber-reinforced polymers and composite materials are used widely.

Overall, Research articles showcased in the Research Topic "*Recent Advances in Functional Materials: Polymers and Composite Materials*" aim to enhance the research interest and understanding in the field of polymers and composite materials. In the future, new avenues of interdisciplinary research utilizing advanced polymeric and composite materials are expected, with researchers from materials science, polymer physics, polymer chemistry and biology backgrounds contributing to advancements in the field. Finally, we appreciate all authors who contributed to the Research Topic and extend our gratitude to the reviewers for reviewing the articles and ensuring the quality of research to maintain the standards of Journal: *Frontiers in Materials*.

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