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Editorial: Editors' showcase: Colloidal materials and interfaces

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Editorial on the Research Topic
Editors' showcase: colloidal materials and interfaces

Colloidal materials play a crucial role in various applications, such as adsorption, catalysis, electrocatalysis, detection, biology, and medicine. The manipulation and understanding of colloidal material interfaces offer exciting opportunities for creating new materials with specific physicochemical properties. As the Specialty Chief Editor of **Frontiers in Materials**, I am pleased to provide a brief editorial on four recent manuscripts focusing on *colloidal materials and interfaces*. This Research Topic includes reviews, perspectives, and original research articles. The manuscripts explore topics such as the synthesis, regulation of interfaces, and atomic-level water analysis techniques of colloidal materials, which are essential for tailoring their magnetic, optical, catalytic, and electronic properties for a wide range of applications.

Siller-Martínez et al. provide a summary of the advancements made in the synthesis of hierarchical superstructures using bicontinuous microemulsions and electrodeposition techniques for polymeric, ceramic, and metallic materials. They also compare these synthetic structures with natural patterns that exhibit similar characteristics. The utilization of soft templates from bicontinuous microemulsions, as well as electrochemical routes, or a combination of both, enables the creation of three-dimensional networks (hierarchical systems) and porous fractal branching. These approaches present exciting possibilities for developing bio-inspired materials with large surface areas and controlled architectures suited for various applications.

Li et al. present a perspective on the latest advancements in aqueous synthesis of metal-semiconductor heterostructures, with a focus on heterointerface regulation. Additionally, they provide a summary of non-epitaxial growth strategies utilizing cation exchange reactions (CER). These strategies enable the synthesis of metal-semiconductor core-shell heterostructures, with well-defined heterointerfaces, effectively mitigating the issue of defective structures caused by significant lattice mismatches and broadening the possible compositions that can be achieved.

Enev et al. conducted a study on hydrogel materials by using a combined thermogravimetry-IR approach. They employed attenuated total reflectance (ATR-FTIR) infrared spectroscopy to monitor the drying process of hydrogels over time. The findings of this work strengthen our understanding of the relationships between the internal structure of materials, supramolecular architecture, and the resulting bio-related properties, providing inspiration for the development of customized materials.

Bendary et al. recently published a study introducing a new photoanode layer double hydroxide (LDH) for dye-sensitized solar cells (DSSCs). The researchers found that the

assembled cell with the CdV-LDH/EY/Lil-l_2/GN composition achieved a remarkable power conversion efficiency (PCE) of 5.4%.

In summary, the above published articles offer comprehensive and insightful knowledge regarding the construction of biomimetic hierarchical superstructure nanomaterials, the regulation of interfacial properties of metal-semiconductor hetero-nanocrystals in aqueous environment, the analysis of water content in hydrogels using a combined thermogravimetry-infrared approach, and the application of a two dimensional Cd-V-LDH photoanode in high efficiency dye-sensitized solar cells. This Research Topic of *colloidal materials and interfaces* presents valuable insights for the precise synthesis and regulation of colloidal materials, which can be utilized in various fields including catalysis, bio-related research, and more.

Author contributions

J-SC: Writing–original draft.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision

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