Editorial

Welcome to *Materials and Interfaces*

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After six months of preparation, it gives me the greatest satisfaction to announce the debut of a new journal that aims to become one of the world's premier journals for disseminating cutting-edge research related to two important subjects: ***Materials*** and ***Interfaces***. It is not an overstatement that everything tangible in the universe is built upon materials unless it exists in the form of atoms or molecules. In essence, a material can be characterized as an assembly of atomic, ionic, and/or molecular building blocks. In addition to the nature of the building blocks, the interactions among them also play a critical role in determining the properties of a material. An interface is the boundary between two spatial regions occupied by different materials, or by the same material in different physical states. Sometimes, the materials involved in such a situation are referred to as different phases. When a material is surrounded by a gaseous environment or vacuum, the interface is often called a surface, a subject that has been extensively explored for centuries in the context of surface science. The journal will cover the design, synthesis, and characterization of materials and interfaces, as well as their applications across a diverse spectrum of fields that may include catalysis, energy conversion/harvesting/storage, electronics, photonics, sensing, diagnostics, and biomedicine. It will serve as the hub for sharing knowledge among materials scientists, chemists, physicists, and engineers, as well as health and life scientists.

The inaugural issue contains contributions from eight research groups, including one perspective article, one review article, and six original articles. In their perspective article, Hong Yang and a coworker discuss the importance to control the surface composition of molybdenum carbide (MoC_x) nanoparticles in optimizing their electrocatalytic performance. After reviewing the surface components and nanostructures favored by thermodynamics for partially-oxidized MoC_x nanoparticles, they highlight the capability of an electrochemical oxidation method in engineering the surface composition. They use a set of examples to illustrate the structure-property relationship, with a focus on the phase dependency of the adsorption energy of reaction intermediates. In their review article, Jingwei Xie and coworkers offer a comprehensive overview of various types of piezoelectric materials, including molecular crystals, ceramics, and polymers, with remarkable piezoelectric performance and biocompatibility. They highlight a number of advanced engineering approaches to the customization of piezoelectric properties for an array of biomedical applications, including tissue engineering, drug delivery, wound healing, and biosensing.

In terms of original research articles, Younan Xia and coworkers report the design and fabrication of a bi-directional and bi-temporal drug delivery system to improve the outcome of a flexor tendon repair by targeting both the initial inflammatory phase and the subsequent proliferative and remodeling phases of healing. The system features a multi-layered structure, with the anti-adhesion and pro-matrix factors encapsulated in separate layers of hyaluronate films crosslinked to different degrees to help control their direction and kinetics of release. Srikanth Singamaneni and coworkers systematically evaluated the structure and properties of metal-organic frameworks (MOFs) as a function of protein loading density using a model system based upon zeolitic imidazolate framework crystals and bovine/human serum albumin. As expected, the concentration of protein in the MOF growth solution significantly affects the morphology, degree of crystallinity, and biopreservation efficacy of the resultant MOF crystals. Within an optimal protein concentration range of 0.1–1 mg/mL, both the structure integrity of the MOF and the immunologic functionality of albumin can be preserved. Xiaohu Xia and coworkers report the development of a unique colorimetric label based on silver-platinum hollow nanoparticles (Ag-Pt HNPs) for colorimetric lateral flow assay (CLFA). The intrinsic enzyme-like catalytic activity of Ag-Pt HNPs enables CLFA with a strong color signal and thereby high sensitivity. Meanwhile, their interior and the involvement of silver make the Ag-Pt HNP-based CLFA cost-effective. Using prostate-specific antigen as a model disease biomarker, they demonstrated a

detection limit as low as picogram-per-milliliter. Yadong Yin and coworkers report the synthesis and characterization of Mn^{2+}-doped ZnS nanocrystals with improved piezocatalytic properties to drive chemical reactions by harnessing mechanical energy. By controlling the doping level of Mn^{2+}, the nanocrystals show enhanced piezocatalytic activity toward the degradation of organic dyes under ultrasonic vibration. Significantly, pre-irradiation of the catalytic material with an ultraviolet light further boosted the efficiency by filling the electron trap states. Huiyuan Zhu and coworkers synthesized a series of Cu_xNi_{1-x} nanoparticles and then investigated their structural evolution during the electrochemical CO_2 reduction reaction (CO2RR). Due to the higher oxophilicity of Ni relative to Cu, the nanoparticles became Ni-enriched at the surface upon exposure to air, promoting the competing hydrogen evolution reaction (HER). With the use of both in situ and ex situ techniques, cathodic corrosion was observed in Cu_xNi_{1-x} nanoparticles at negative activation potentials, leading to the significant loss of Ni and thereby the formation of irregularly shaped Cu nanoparticles with increased defects. The structural evolution shifted the electrolysis from HER to CO2RR, enhancing the Faradaic efficiency of multi-carbon products (C_{2+}). Yugang Sun and coworkers report the synthesis of polyaniline (PANI) nanotubes with a strong broadband optical absorption by leveraging the power of single-crystalline MnO_2 nanotubes as a solid-state oxidant to induce polymerization in an acidic solution. The high crystallinity and smooth surface of the MnO_2 nanotubes provide an ideal solid/liquid interface for templating the formation of PANI nanotubes. The template-directed synthesis was also extended to silica-coated MnO_2 nanotubes for the fabrication of silica-coated PANI nanotubes with versatile chemistry for convenient grafting of other interesting motifs.

The articles published in the inaugural issue cover a range of representative and exciting snapshots regarding recent progress in the context of materials and interfaces. It is hoped that the readers will enjoy the mix of topics presented in this issue and, most importantly, find the inspiration to push these research fronts to the next level of success. Personally, I want this journal to be broad in outlook and inclusive. I especially welcome contributions from colleagues in all disciplines, including chemistry, physics, biology, chemical engineering, materials science and engineering, biomedical engineering, mechanical engineering, electrical engineering, biological engineering, and even geology. I want to thank the members of advisory board and the authors, as well as the remarkable staff in the journal office for their help in putting this first issue together, and I look forward to receiving feedback and contributions from the community.

Conflicts of Interest: The author declares no conflict of interest.