Horizons Community Board collection – emerging 2D materials for energy and electronics applications

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Materials Horizons and Nanoscale Horizons

set up their Community Boards several years ago, aiming to support early career researchers so that they can share their experiences and ideas on scientific publishing. As future leaders in their respective fields, the Community Boards also provide a channel for members to build relationships across their research community and develop their own editorial skills.

We are delighted to continue our series of post-publication online article collections, led by our Community Board members across both Materials Horizons and Nanoscale Horizons.

Working together and sharing their unique areas of expertise, our Community Board members have recommended several key topics where significant, rapid progress has been made in the last 2 years. They have selected top articles published in the Horizons journals to showcase the most important advances in each topic area.

Emerging 2D materials

Li Li, Tianyi Ma, and Nan Zhang present the second Horizons Community Board collection on emerging 2D materials for energy and electronics applications.

Read the collection here.

2D nanomaterials, including carbon-based materials, metals, metal oxides (and sulfides), black phosphorus (BP), etc., have aroused extensive interest in energy and electronics applications due to their attractive structure-dependent properties. In this themed collection, we are compiling some noteworthy articles focused on sensors, lithium-ion batteries, supercapacitors, photo(electro)catalysis, photodetectors, electronics and optoelectronics. As typical 2D carbon materials, graphene and doped graphene exhibit high performances in these fields, as indicated by Li et al. (DOI: 10.1039/C6MH00587J) and Chua et al. (DOI: 10.1039/C7MH00068E) in their research works published in Materials Horizons.

2D metal and metal sulfide materials, as illustrated through the research works of Chen et al. (DOI: 10.1039/C7NH00091J) and Li et al. (DOI: 10.1039/C8NH00419F), have shown two-dimensional geometric structures together with unique physical properties, which make the materials quite promising candidates for applications in electronics and optoelectronics. Lou et al. (DOI: 10.1039/C3MH00077J) provided an effective approach for growth of SnO2 nanosheets on various conductive substrates to increase the energy density of the integrated electrodes. A review article about 2D BP published by Zhou et al. (DOI: 10.1039/C7MH00543A) summarized the recent developments in the study of BP – it covered the state-of-the-art synthesis methods for preparing single-layer or few-layer BP, the recent advances in characterizing its electronic, optical and mechanical properties, and the reported functional devices utilizing such properties.

Since these research works show that these emerging 2D materials have excellent performances and prospects, it will be important to see how they enrich the future of energy and electronics applications. We hope that readers will obtain valuable information from this themed collection.

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Materials Horizons Community Board member Dr Tianyi Ma received his PhD in Physical Chemistry in 2013 from Nankai University, China. He then worked as a postdoctoral research fellow from 2013 to 2014 in University of Adelaide, Australia. He was awarded the Australian Research Council (ARC) Discovery Early Career Researcher Award (DECRA) in 2015, and continued independent research on the rational design of nanostructured materials with a large variety of components from carbons, metals, metal oxides, organic polymers, to metal–organic frameworks. His current interests lie in energy and environment related applications of functional materials including catalysis, adsorption and separation, and energy conversion and storage.

Nan Zhang
Materials Horizons Community Board member Professor Nan Zhang received her PhD degree in Inorganic Chemistry in 2016 at the State Key Laboratory of Photocatalysis on Energy and Environment, Fuzhou University, China. She then worked as a postdoctoral research fellow from 2016 to 2017 at National University of Singapore. She was supported by the National Postdoctoral Program for Innovative Talents in 2017 and worked on the optical property optimization of nanostructured metal materials toward the applications in photocatalysis. She is currently a full professor working at the College of Materials Science and Engineering, Hunan University, China. Her main research interests include the fabrication of carbon-based composites and metal nanostructures for solar energy conversion.