

Editorial

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Much of the current interest in energy research has been focused on novel materials discovery and achieving high efficiencies in regard to their end applications. This approach has been laid out for various kinds of alternative energy systems and materials. However, bridging the knowledge gap between the material discovery and end energy application is critical and could be achieved by understanding the synthesis of materials; integrating materials systems into alternative energy systems by way of advanced manufacturing techniques; evaluating theory and modelling aspects; and finally, testing these materials for fundamental properties. This issue of *Nanomaterials and Energy* specifically emphasises all these aspects to bridge the knowledge gap described above.

As the need for nanocomposites for energy-efficient systems is rapidly growing, it is essential to analyse robustness of polymer nanocomposites and achieve unique behaviour by impregnating them with high-strength fillers such as graphene; thus, Wang and Song review the toughening of polymers by using graphene fillers. Chen and Ravindra present an article emphasising first-principle calculations to understand and predict crystal ordering and composition for $\text{CdS}_x\text{Te}_{1-x}$ alloys. In regard to rapid synthesis for bulk energy nanomaterials, an article by Hoang and Gregory demonstrates mechano-chemical synthesis in regard to hydrogen storage and lithium ion battery materials. Similarly, the article by Kumar *et al.* describes microwave-assisted synthesis of ceria-based novel materials for energy applications. Bara *et al.* demonstrate an

advanced additive manufacturing technique – three-dimensional (3D) printing. Their article describes this technique for producing novel and advanced gas-treating component design. This area of research has strong energy relevance, where removal of contaminants from gaseous mixtures has implications in carbon dioxide capture. Bara *et al.*'s article brings forward efforts from the authors' laboratory as well as outlining opportunities and challenges in this field of research. Another article, by Varghese, reviews the approaches towards carbon dioxide recycling by way of solar photocatalysis. A further, more detailed review of photocatalytic approaches from a theoretical point of view is presented by Shi and Chopra. They review combinatorial approaches for efficient screening of multicomponent photocatalysts and fuel cell catalysts. A more specific study on photocatalysis is presented by Agartan *et al.*, with a focus on sol-gel-derived TiO_2 powder.

With this issue, we also encourage our readers and authors to consider *Nanomaterials and Energy* for future submissions as our editorial board and staff are continuously working hard to facilitate highest-quality publications. There are also upcoming themed issues in the area of (a) two-dimensional (2D) layered nanomaterials for energy and (b) combustion and polymer nanocomposites. We, the *Nanomaterials and Energy* team, and ICE Publishing also wish all our readers a very happy and prosperous 2014. This year will bring in more energy challenges and discoveries that *Nanomaterials and Energy* looks forward to share with our scientific community.