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Editorial

1D Nanomaterials 2012

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We witnessed an initial hyped period and enthusiasm on carbon nanotubes in the 1990s later went through a significant expansion into nanotubes of other materials (metal dichalcogenides, boron nitride, etc.) as well as various nanowires and nanorods. While much of the hype might have gone, the research on one-dimensional (1D) nanomaterials has matured as one of the most active research areas within the nanoscience and nanotechnology community, flourishing with ample, exciting, and new research opportunities. Just like any other research frontier, researchers working in the 1D nanomaterials field are constantly striving to develop new fundamental science as well as potential applications. It remains a common belief that versatility and tunability of 1D nanomaterials would challenge many new rising tasks coming from our resource and energy demanding modern society. The traditional semiconductor industry has produced so many devices and systems from transistors, sensors, lasers, and LEDs to more sophisticated solar panels, which are now part of our daily lives. By downsizing the core components or parts to 1D form, one might wonder how fundamentally the dimensionality and morphology would impact the device performance, this is, as always, requiring us to fully understand the structure-property relationship in 1D nanomaterials. It may be equally crucial in connecting discovery-driven fundamental science to market-driven technology industry concerning potentially relevant findings derived from these novel materials. The importance of a platform that allows active researchers in this field to present their new development in a timely and efficient manner is therefore self-evident. Following the success of two early special issues devoted to 1D nanomaterials, this is the third one in a row organized by the same group of guest editors, attesting that such a platform has been well received by the readers.

A total of 18 articles (out of 36 submissions) are presented in the current issue. Twelve of them were contributed from Asia region, 5 from North America, and 1 from Europe. Reasonably diversified object materials are covered, but carbon nanotubes (C. Mateo-Mateo et al.; B.-W. Jeong; S. Park et al.; K.-S. Lin et al.) and ZnO nanowires (H. Qi et al.; S. Wang et al.; D.-H. Kuo and J.-Y. He; M. H. Mamat et al.) have attracted most research interest, maintaining their comfortable leading positions in nanotube and nanowire categories, respectively, as we have noticed in preceding special issues. Though CVD (S. Park et al.; H. Qi et al.; D.-H. Kuo and J.-Y. He; M. Cross and W. Varhue) and hydrothermal (M. H. Razali et al.) processes have been extensively applied in the synthesis, less common but promising methods such as diffusion-controlled solid state formation (S. G. Jeon et al.) and electrospinning (S. Q. Zhu et al.) are also introduced. It is also interesting to observe that, even in conventional CVD setup, a more sophisticated control on the growth of 1D nanomaterials was attempted by employing techniques such as catalytic bilayers (H. Qi et al.; D.-H. Kuo and J.-Y. He) and electrostatic forces (M. Cross and W. Varhue). A couple of articles reported specified spectroscopic studies on 1D nanomaterials/composites using Raman spectroscopy (E. E. Ibrahim et al.) and X-ray absorption spectroscopy (Md.

A. Mannan et al.), which may inspire the use of elegant characterization protocols and tools for some particular purposes.

Nanoelectronics, nanophotonics, nanomaterials for energy conversion and storage, and nano-bio interfacing materials, to name a few, have emerged as important subfields for 1D nanomaterials research, and each represents an exciting direction. By taking a glimpse at this special issue, one can also get a quick idea that these exciting research directions are well represented. The application prospects reported in these articles range from efficient light emitter (N. Ekthammathata et al.) to transparent conductive electrode (S. B. Sepulveda-Mora and S. G. Cloutier) and ultraviolet photoconductive sensor (M. H. Mamat et al.), from diluted magnetic semiconductor (S. Wang, et al.) to surface enhanced Raman scattering on a single nanowire (H. Qi et al.) and DNA molecules (C. Deng et al.), as well as hydrogen storage for fuel cells (K.-S. Lin et al.), and so forth. We are pleased to have included these contributions representing future research directions and technology trends.

On the other hand, as stated in the 2011 Editorial, we feel that the toxicity and recycling issues concerning 1D nanomaterials have been generally overlooked. The future of nanoscience and nanotechnology, most likely not limited to 1D regime, will be largely dependent on how well we can balance the cost and performance in order to construct any real and practical device and system. As guest editors, we would like to signalize this message again and invite future studies to address the health, safety, and economic concerns related with 1D nanomaterials, which, if not well tackled, may become a bottle neck to achieve real and practical engineering applications.

Acknowledgments

Finally, we would like to thank all the authors and coauthors who have made conspicuous contributions and all the reviewers for their valuable time and dedication to this special issue which we hope is enjoyable to read.

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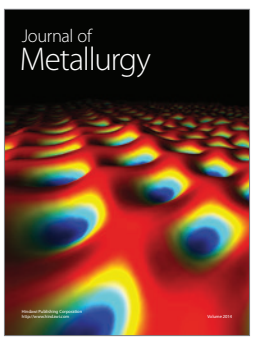
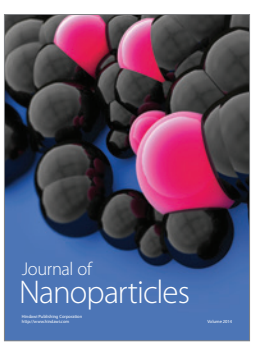
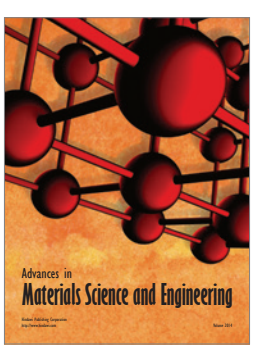
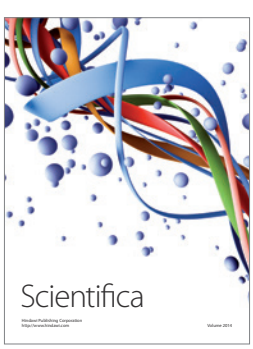
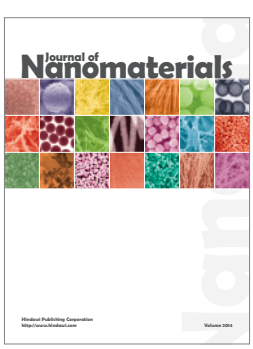
Raymond Whitby
Steve Acquah

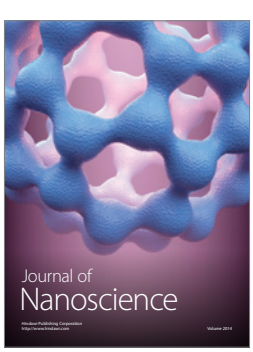


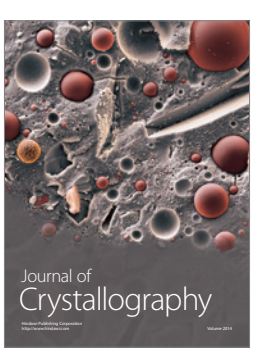


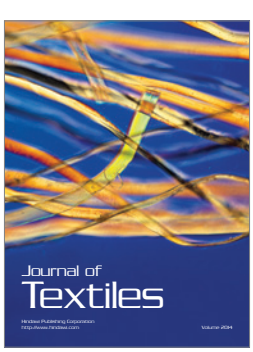












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