

Editorial

## At the beginning of a long journey

When I see an announcement for a new journal or receive an invitation to submit a paper, both of which come to my mailbox almost on a daily basis, I always ask myself this: Why do we need so many scientific journals? They seem to multiply like rabbits in the spring! Well, when I received a call from Tomsk State Polytechnic University (TPU) with an offer to become an editor-in-chief of a new journal, it was most natural to ask the same question and to find an answer to it for myself. This editorial is a summary of discussions with my colleagues, associated editors, and the TPU leadership about the mission, vision and strategy for our new journal.

The need for development of resource-efficient technologies is obvious and well recognized. With the human population exceeding seven billion people [1], there is an emergent need for understanding and a deep concern for the Earth's limited resources which provide a strong driving force for advancement in sustainable and resource-efficient use of natural resources such as oil, gas, minerals, water and air. Waste management, recycling, and carbon-neutral energy sources have become large industries and markets as well as every day issues for the corporate world, local and federal governments, media and the subjects for education and science. For example, a shortage of such metals as platinum and indium has stimulated research in the replacement of these rare and precious metals by more abundant and less expensive analogs with the same/similar efficiency for electronics, energy and other applications [2,3]. Monitoring and cleaning of the environment has become one of major thrusts in biotechnology research and applications [4,5]. Replacement of mineral oil and gas by solar, wind and geothermal energy provides potential solutions for an ever-growing energy demand, environmental issues and climate changes [6].

As a result of the growing research related to resource-efficiency and sustainability, many new journals have been started by large and small publishers with focus areas on some of the related issues such as *Journal of Industrial Ecology* (Wiley), *Green Chemistry* (Royal Society of Chemistry), *Renewable Energy* (Elsevier), *Journal of Renewable and Sustainable Energy* (AIP), *Wind Energy* (Wiley), *Solar Energy* (Elsevier), *Bioresource Technology* (Elsevier), *Environmental Science and Technology* (ACS), *Journal of Volcanology and Geothermal Research* (Elsevier), *Environmental Chemistry* (Springer), *Natural Resources Research Atmospheric Chemistry* (Springer), *Fuel Processing Technology* (Elsevier), *Waste Management* (Elsevier), *Resource, Conservation and Recycling*

(Elsevier). Meanwhile, to the best of our knowledge, there was no existing journal which combined resource-efficiency and related technologies with the same aim and scope prior to our journal launch by Tomsk Polytechnic University in partnership with Elsevier. The combination of the keywords *resource-efficiency and technologies* is critical for our journal mission in the scientific publishing community as we aim to create a forum for technology research with a broad scope but a clear sharp focus – efficient and sustainable use of resources, materials and energy.

By analogy with the famous Einstein equation,  $E = mc^2$ , materials and energy efficiency are ultimately connected to each other. For example, making a battery of solar cells to reduce usage of mineral oil, gas or coal requires energy for the production of semiconductor devices from natural starting materials, e.g., silica. Cleaner technologies save energy and materials required for environment restoration. Biofuel is a source of solar energy converted by photosynthesis and stored in plants and algae. Waste management and recycling often requires substantial use of energy to convert useless and often toxic materials into useful ones. Besides the intrinsic interconnectivity of the industrial efficiency of energy and materials use, another important connection line for resource-efficient technologies, which has been often ignored in the past but become critical for our world of limited resources, is the one between manufacturing costs and sustainability. Something made “dirt cheap” today with a corresponding high level of environmental pollution becomes very expensive tomorrow by generating multiple cost issues ranging from cleaning the environment to medical expenses for a sickened population to research into solving devastating ecological problems. One of the economic indicators of interrelation between cost of production and sustainability is the so-called social cost of carbon (SCC) [7].

Although the primary scientific research areas would be most clearly defined as multi-disciplinary materials science and engineering in application for resource-efficient technologies, we also plan to publish occasional reviews, tutorials and commentaries (discussions) which would cover the economic and social aspects of these technologies particularly when introduction of new (revolutionary) technologies may initially meet economic (high costs) or social barriers (conservatism, monopoly, etc.). With our journal recognition and impact to grow in the future, we also aspire to become an educational and research forum by launching series of conferences and workshops in collaboration with the journal owner and primary sponsor, Tomsk Polytechnic University. We believe that

building a network of researchers, research centers and industrial partners would benefit in collaboration with our international team.

Tomsk Polytechnic University is the oldest engineering higher school in the Asian part of Russia and one of the leading Russian universities. It encompasses resource-efficient technologies as its major focus in education, research, technology development and commercialization. This positions our journal as one of the university's arms for connection with the international network of scientists in its top priority area of research. TPU graciously provides an opportunity for free open access publication under the umbrella of Elsevier, one of the world largest publishers of scientific information. As a result, our international editorial team will secure an unbiased review of all papers. The only criteria for getting published are paper quality and matching the journal's topic aim and scope.

We look forward to an exciting journey of collaboration with the international research community in development of a new

scientific journal in one of the hottest areas of materials science and engineering – resource-efficient technologies!

## References

- [1] <http://www.worldometers.info/world-population/> (accessed 08.06.15).
- [2] A. Serov, C. Kwak, *Appl. Catal. B. Environ.* 90 (2009) 313.
- [3] A. Kumar, C. Zhou, *ACS NANO* 4 (2010) 11.
- [4] D.R. Livingstone, *J. Chem. Technol. Biotechnol.* 57 (1993) 195.
- [5] B.E. Rittmann, P.L. McCarty, *Environmental Biotechnology: Principles and Applications*, McGraw-Hill, NY, 2012.
- [6] J. Chow, R.J. Kopp, P.R. Portney, *Science* 302 (2003) 5650.
- [7] <http://www.epa.gov/climatechange/EPAactivities/economics/scc.html> (accessed 08.06.15).

Anatoli Korkin

*Editor-in-chief, Resource-Efficient Technologies Journal,  
Arizona State University, Biodesign Institute, United States*

*E-mail addresses: [Anatoli.Korkin@asu.edu](mailto:Anatoli.Korkin@asu.edu);  
[korkin@nanoandgiga.com](mailto:korkin@nanoandgiga.com)*