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Editorial

Contributions from all Areas of Nanotechnology and Materials Science Are Invited!

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Introduction

The Journal of Nanotechnology & Material Science aims to attract high quality manuscripts from all areas of nanotechnology and materials science. It will foster the understanding of the underlying paradigms of nanomaterial synthesis, characterization, and application by providing a discussion platform that is unrestricted by arbitrary limitations with regard to nanomaterial related research topics.

Virtually all technology improvements depend on the availability of suitable materials. The development of nanotechnology has been extensively funded in the US, Europe, China, and Japan for more than 20 yrs[1] and in spite of ample success in fundamental nanoparticle research, there are several critical needs that have not been addressed in depth by the nanomaterial research community.

We are in need of synthetic procedures for large-scale nanoparticle synthesis that follow thermodynamic, not kinetic principles. It is virtually impossible to adapt kinetic procedures to large-scale synthesis because the slightest variation in experimental conditions (e.g. temperature, pressure, concentrations…..) will lead to differences in nanoparticle diameters and shape, as well as their resulting physical properties. In sharp contrast, in thermodynamic synthesis procedures, nanoparticle shape and geometric extensions will eventually converge to defined parameters. For widespread nanotechnology applications in all areas of our lives, the large-scale synthesis of defined nanomaterials will be the key technology. Success in this area will clearly be transformative for our whole society. Therefore, it is high time to concentrate our engineering efforts in this area.

With respect to nanoplatform and nanocatalysis design, many research groups have been following a biomimetic approach, mimicking fractal geometries and catalysis principles found in nature. Although this approach has produced various successes in nanomaterials synthesis, it is limiting the scope of the overall approach to novel materials. Therefore, we would like to encourage chemists and engineers to go "Beyond Biomimetic". Instead of solely mimicking biological structures, novel nanomaterials should make use of the unique properties of all the elements that are not found in natural structures, as well as of the resulting unique physical properties of nanomaterials when subjected to electromagnetic fields (for instance plasmonic properties and super paramagnetism). As already outlined above, this journal will strive to provide a barrier-free discussion platform for high quality approaches to novelty in nanomaterials research. This discussion will help editors, authors, reviewers and readers alike in expanding the boundaries of our thinking. New materials with unprecedented properties will result from this process.

Surprisingly small efforts have been made to harvest the potential of nanotechnology for engineering better medicines. The medical community is in dire need of novel methods for defined drug delivery to the sites of infections, cancer, and other diseases. Principally, this could be achieved by combining nanoparticle properties that are not found in nature with already established nanoformulations for drug delivery. In 1998, the NIH has created the Innovative Molecular Analysis (IMAT) program[2], and in 2001, the U54 Cooperative Specialized Research Centers[3]. Both funding mechanisms, which have not been continuously offered, are focused on well-defined diseases and aimed at importing previously developed platform technology into the clinic. In sharp contrast, the research and engineering efforts that we would like to encourage, will be aimed at discovering novel platform technologies without any restrictions imposed by specific medical guidelines. Medical progress will critically depend on the availability of novel materials.

In conclusion, advanced nanomaterials are clearly underutilized in today's societies. Their worldwide application will critically depend on unimpeded information transfer, to which this journal would like to make a contribution. It will also be dependent on the development of production methods that are affordable by everybody, and not only the richest Nations. Therefore, we invite chemists and engineers from all societies to compete in the quest for the most cost-effective and, consequently, renewable synthetic procedures for nanomaterials that can be used in one of the three general areas discussed above. Let's go together where no one has gone before.

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