Editorial

Mark J. Jackson*

Center for Advanced Manufacturing,
College of Technology,
Purdue University,
West Lafayette, IN 47907-2021, USA
E-mail: jacksomj@purdue.edu
*Corresponding author

Waqar Ahmed

School of Computing, Technology
and Physical Sciences,
University of Central Lancashire,
Preston PR1 2HE, UK
E-mail: wahmed4@uclan.ac.uk

Michael Harris and Robin Clarke

School of Electrical and Mechanical Engineering,
University of Ulster,
Newtownabbey, Co. Antrim BT37 0QB, UK
E-mail: dmj.harris@ulster.ac.uk
E-mail: rb.clarke@ulster.ac.uk

Biographical notes: Mark J. Jackson is currently an Associate Professor in the College of Technology at Purdue University in West Lafayette, IN, USA. His research interests are in nanomanufacturing and advanced surface coating technologies.

Waqar Ahmed is a Professor and is holds the Chair of Nanotechnology at the University of Ulster besides conducting research in the area of thin films and nanotechnology. He is the Editor of the International Journal of Molecular Engineering and the International Journal of Nanoparticles.

Michael Harris is a Professor of Mechanical Engineering at the University of Ulster. He is one of the principal organisers of the 23rd International Manufacturing Conference held at Ulster, and is conducting research in the area of manufacturing technology.

Robin Clarke is the Head of Mechanical Engineering at the University of Ulster. He is one of the principal organisers of the 23rd International Manufacturing Conference held at Ulster, and is conducting research in the area of manufacturing processes and mechanical engineering.

The new millennium has seen the birth of a new perspective that conflates research in solid-state physics, biological sciences, as well as materials engineering. The perspective is one that recognises that future new advances in all these areas will be based on a fundamental understanding of the atomic and molecular infrastructure of materials that has resulted from two centuries of chemistry. Major advances will be achieved when the novel behaviour, in particular the quantum mechanical behaviour, that nanoscale structures possess, can be controlled and harnessed. Medical devices and surgical tools that contain micro and nanoscale features allow surgeons to perform clinical procedures with greater precision and safety in addition to monitoring physiological and biomechanical parameters more accurately. While surgeons have started to master the use of nanostructured surgical tools in the operating room, the impact and interaction of nanomaterials and nanostructured coatings is yet to be addressed in a comprehensive manner.

Nobel Laureate Richard Feynman's revolutionary vision on nanotechnology was captured in a paper published in the February 1960 issue of Caltech's journal, *Engineering and Science*. In this paper, Feynman speaks about manipulating atoms and constructing products atom-by-atom, and molecule-by-molecule. Feynman describes the scaling down of lathes and drilling machines, and talks about drilling holes, turning, moulding and stamping parts. Even in 1959, Feynman had describe the need for micro and nanofabrication as the basis for creating a microscopic world that would benefit mankind. Nanotechnology encompasses technology performed at the nanoscale that has real world applications. Nanotechnology will have a profound effect on our society that will lead to breakthrough discoveries in materials and manufacturing, medicine, healthcare, the environment, sustainability, energy, biotechnology and information technology. President Bill Clinton talked about the exciting promise of nanotechnology in January 2000, and later announced an ambitious National Nanotechnology Initiative (NNI) that was enacted in 2001 with a budget of $497 million to promote nanoscale research that would benefit society. Nanotechnology is the ability to manipulate atoms and molecules to produce nanostructured materials and functional nanocoatings on biomedical devices and surgical tools. Nanotechnology is likely to have a significant effect on the global economy and on society in this century, and it promises to make breakthroughs in the biological and medical sciences.

The journal presents information on subjects associated with nano and biomaterials. Professor Ahmed and I hope that this Special Issue will serve as a reference volume consisting of high quality research papers especially for research workers in the field of nano and biomaterials. The papers presented in this volume have been refereed by peer reviewers who are experts in the field of nano and biomaterials. The referees have been extremely helpful and have returned reviews as per schedule. We both wish to thank them for their reviews and the authors for submitting such high quality research papers.