

Editorial

Application of Nanomaterials in Bioengineering

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Serious concerns about multidrug-resistant microorganisms and increasing healthcare costs have encouraged research efforts in the definition of novel prevention and treatment of infectious diseases. Nanotechnologies provide interesting unconventional routes towards novel approaches in bioengineering by exploiting the unique properties of some materials at nanometric scale. The development of innovative biomaterials and biological systems can have a huge impact on medicine, in particular when conventional methods and therapies fail.

The purpose of this special issue is to provide the reader with the most recent scientific advances in bioengineering, by analysing the potential of different nanomaterials for a wide range of biomedical applications such as surface disinfection, drug delivery, cancer therapy, and tissue engineering. Such variety of applications indicates the great interest of the scientific community towards nanotechnologies as an effective platform to develop novel approaches for health and wellbeing. Among the contributions submitted to this special issue, relevant papers and review articles with different topics have been selected for publication.

In “The Recent Advances of Magnetic Nanoparticles in Medicine” by T. Guo et al., the potential of magnetic nanoparticles for application in medicine is discussed. Categories, properties, modification, and applications of magnetic nanoparticles in MRI, in tumour magnetic inductive hyperthermia, and as a vector are presented.

In “Surface Disinfections: Present and Future” by M. Saccucci et al., the discussion is focused on antibiotic

resistance in hospital infections and surface disinfection, with a specific focus on disinfection procedures by using nanomaterials. Among them, the authors discuss the use of graphene-based nanomaterials as novel antimicrobial drugs.

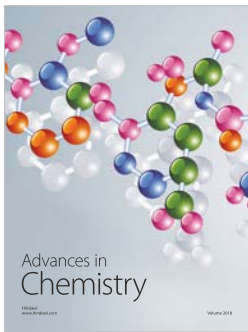
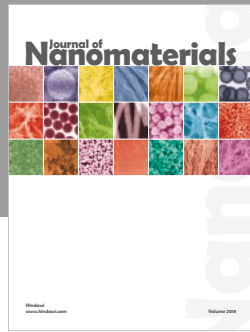
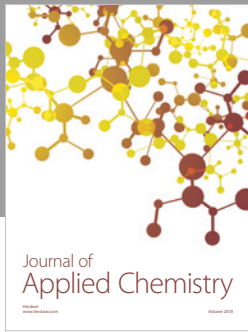
In “Tribomechanical Properties of a Carbon-Based Nanolayer Prepared by Nitrogen Ion Beam Assisted Deposition for Finger Joint Replacements” by T. Horazdovsky and R. Vrbova, research on the mechanical properties of deposited nanolayers of carbon on titanium alloys using a nitrogen laser is discussed. The paper discusses the positive effect of surface bombardment by nitrogen lasers, in relation to decreased fault wear and potential increase in material usability.

In “Preparation and Drug Release Study of Novel Nanopharmaceuticals with Polysorbate 80 Surface Adsorption” by X. Tao et al., the authors describe the preparation of donepezil drug-loaded nanoparticles with cholesterol-modified pullulan as nanocarrier and surface modification for enhanced targeting and sustained release. The article aims to provide experimental basis for the research of pharmaceutical preparation in the treatment of nervous system diseases.

In “Carbon Nanomaterials for Breast Cancer Treatment” by M.L. Casais-Molina et al., the applications of carbon nanomaterials in the identification, diagnosis, and treatment of breast cancer are discussed. In particular, this review article describes the potential of carbon nanomaterials for drug delivery and/or release, for photodynamic therapy, for use as contrast agents in diagnosing and locating breast tumours, and for biosensors.

In “Icariin-Loaded TiO₂ Nanotubes for Regulation of the Bioactivity of Bone Marrow Cells” by Y. Zhang et al., the fabrication of TiO₂ nanotubes loaded with icariin is presented for application in dental implants. The research explores the effect of icariin-loaded TiO₂ nanotubes on bone marrow cells and the potential of icariin as an osteogenesis agent in bone tissue engineering.

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