Editorial

Novel Strategies to Eradicate Bacterial Communities Based on Nano and Biomaterials

Infectious diseases continue to be one of the greatest health challenges worldwide. The main drawbacks for the currently used antimicrobial agents are the development of multiple drug resistance and adverse side effects to conventional antibiotics. Drug resistance enforces high dose administration of therapeutic agents, often generating intolerable toxicity. There is now widespread recognition of the biofilms contribution to human infection. Cases of biofilm infection include the well-known examples of device-related infections such as those associated with artificial joints, prosthetic heart valves and catheters. Nanotechnology, the use of materials with dimensions on the atomic or molecular scale offers new perspectives for the development of new approaches to destroy or inhibit the activity of different microbial strains, as well as for obtaining optimized biomaterials with anti-adherence properties. The explosion of nanotechnology applications in the biomedical field motivates the purpose of this special issue of Current Organic Chemistry to summarize current research findings concerning the nanotechnology based solutions emerged as new tools to track the current challenges in treating infectious diseases.

Chifiriuc *et al*., describe the potential of polymers in the modern medicine, impacting on different fields, such as tissue engineering, diagnostic and therapeutic strategies. Polymers have been used to control the rate of drug release, prevent toxicity, protect drugs from degradation before delivery, and target drugs to the site of action, improving absorption, bioavailability and therapeutic efficacy. This review presents the current status of research and clinical applications of natural polymers as drug delivery systems for different administration routes.

Yen *et al*., give an overview in the development of innovative biosensing technologies for detecting pathogens, and evaluating the anti-microbial susceptibility tests. Recent advances in the field have been focused on the development of miniaturized biosensors with high sensitivity, specificity and stability. Several electrical biosensing techniques, such as ion-sensitive field effect transistor, nanowire, and microcantilever as well as advantages and achievements of each electrical biosensing technique are reviewed.

Nedelcu *et al*., discuss silver nanostructures. Silver is a well known antimicrobial agent active against a wide range of microorganisms (over 650 microorganisms from different classes such as gram-positive and gram-negative bacteria, fungi) and viruses. Due to the acceptable ratio between beneficial and negative effects, silver gained advantages over many other antimicrobial agents, especially antibiotics. The current review focus on the synthesis, characterization and size and shape - activity relationships of silver nanoparticles for biomedical applications.

Holban *et al*., report describe the most recent findings concerning the usage of magnetic nanoparticles as potent drug delivery shuttles in anti-microbial approaches.

Oprea *et al*., present the current knowledge on the antibacterial and antifungal activity of ZnO nanoparticles, as well as the factors influencing it, such as the size and the presence of light. The potential applications include, but are not limited to, topic drugs, cosmetics or components for agents that control the spread of bacterial strains (antibacterial paints used in hospitals, antibacterial coatings for fabrics, antibacterial packaging for food etc).

Chan *et al*., give an overview about the current research progress in nanotechnology. Significant evidence has demonstrated that nanoparticles can be effective in treating microbes with acquired resistance phenotypes. This study reviewed the latest advances in using nanoparticles for their antimicrobial activities, and for the delivery of antimicrobial drugs.

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