

Nanomedicine and Biomimetics: Life Sciences meet Engineering & Physics

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Within the last few years, a variety of new techniques has been developed that are already widely used, allowing for accurate characterization and manipulation of features at the nanometer range, thereby opening up completely new perspectives in nearly all fields of modern science. These areas include physics and life sciences as well as tribology, engineering, chemistry, materials science and computational approaches, which altogether communicate and are closely linked, forming the complex research sector that is referred to as Nanotechnology.

Often, research is inspired by nature itself, so for example nanostructures of cat teeth and chameleon tongues inspire novel low-noise aircraft (cooperation with the Advanced Concepts Center of Boeing).

Other fields using the advantageous principle of Biomimetics include the sector of Nanomedicine, which is expected to strongly profit from the recently gained insights in the nanoworld. A deeper understanding of the fundamental principles of nature itself will provide new ways and possibilities for the influence and interaction with biological systems. Nanotechnology already has and will to an increasing degree have an impact on the medical research in the future. Although new diagnostic tools and improved ways of drug administration have already been developed as a first fruit of the upcoming nano-era, still many challenges and problems remain unsolved and the technology is far from using the wide variety of opportunities offered.

To meet this demanding task, Nanomedicine like no other area of research requires a close collaboration of people from technology and biology, and only a thoroughly linked network will be able to bring this novel sector to its full potential.

The importance and the difficult challenges coming along with Nanotechnology together with its impact on the developments and improvements in Nanomedicine and other “hot topics” will be explained. Further on an illustration of the state of the art in medically applied Nanotechnology will be given as well as an outlook on the upcoming trends in the next few years.

Primary wishes that biologists carry to technicians and vice versa will be discussed, and the benefits of a close network between medical/pharmaceutical research and the engineering tribology community will be outlined.