

Risk governance of bioinspired advanced materials

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Abstract

Bioinspired advanced materials are derived via biomimetic principle transfer from advanced functional materials in organisms. Plants, animals and microorganisms excel at producing materials which show specific properties such as exceptional wear resistance, resistance against aggressive chemicals or heat. A major proportion of these materials are based on nanoscale functionalities (Gebeshuber, 2016). However, most of these natural materials are not used in technology for several reasons, but their fundamental structural and functional principles serve as a blueprint for innovative modification of engineered materials where production processes are already established. One of the basic principles stemming from green chemistry and green nanotechnology – in addition to optimum material and energy management – is the application of inherent safety features derived from natural matter, basically at a rather early stage in the innovation process. This can be achieved by substitution of hazardous substances, structures and reactions with matter of similar composition and similar functionality. New promising bioinspired materials offer a great variety of new functions and possibilities for a wide range of applications in various fields. To foster the research on these innovative materials it will be beneficial to integrate safety and sustainability aspects as early as possible in the innovation process. This has been the approach of the European Commission demanding a “safe and responsible research on nanotechnologies” as laid down in the European Nanotechnology Action Plan and similar provisions of research programmes on the national level in Austria, Germany and Switzerland. These research policies provide for several fundamental principles to intertwine innovation and safety applying a holistic risk governance process. Cornerstones of this kind of progressive research policy is the establishment of multi-actor networks including expertise from all relevant bodies (ministries, authorities, research, industry, civil society), the installation of an independent risk and safety research programme to ensure public credibility and transparent public communication processes to integrate usability aspects. This contribution will highlight the main experiences from the long-lasting Austrian NanoTrust project (2007 – at least 2020) and the Austrian nanotechnology risk governance process which might be a model to be transferred to advanced materials as well (Gzásó et al., 2015).

Keywords: Advanced materials, bioinspired materials, positive technologies, risk governance, sustainable innovation

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Reference (Not more than 5, please follow the below reference style if any).

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