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Thomas Speck studied biology at the University of Freiburg, finished his PhD in 1990 and received 1996 after his habilitation the venia legendi for botany & biophysics. After a visiting professorship at the University of Vienna, Thomas Speck received offers for professorships at the Humboldt-University in Berlin and at the University of Freiburg. From 2002 until 2006 he was associate professor for 'Botany' at the University of Freiburg and director of the Botanic Garden. In 2006 he received an offer for a full professorship at the Freie University Berlin combined with the directorship in general of the Botanic Garden & Museum Berlin-Dahlem. He decided to stay as director of the Botanic Garden in Freiburg and holds since 10'2006 the chair for 'Botany: Functional Morphology and Biomimetics' . He is speaker of the state-wide Competence Network Biomimetics, board member the federal Bionics Competence Network BIOKON e.V., vice-president of BIOKON international - The Biomimetics Association, vice-chair of the Society for Technical Biology and Bionics, and board member of the Biomechanics Group of the Society for Experimental Biology, U.K. Thomas Speck is deputy director of the Freiburg Center for Interactive Materials and Bio-Inspired Technologies (FIT) and scientific member of the Materials Research Centre Freiburg (FMF). For his research in the fields of biomimetics and biomechanics, and his activities for Botanic Gardens he received several scientific awards. Thomas Speck is (co-)editor of several scientific books and journals and has published more than 500 scientific articles in the fields of functional morphology, biomechanics, biomimetics, evolutionary biology and palaeobotany.

Abstract:

Biomimetic Materials: Smart and Multifunctional Solutions for Technical Challenges of the 21st Century

Biomimetics and BIOKON, Freiburg Materials Research Centre (FMF) and Freiburg Centre for Interactive Materials and Bio-Inspired Technologies (FIT)
During the last decades biomimetics has attracted increasing attention as well from basic and applied research as from various fields of industry. Biomimetics has a high innovation potential and offers the possibility for the development of sustainable technical products and production chains. Novel sophisticated methods for quantitatively analyzing and simulating the form-structure-function-relationship on various hierarchical levels allow new fascination insights in multi-scale mechanics and other functions of biological materials and surfaces. On the other hand, new production methods

enable for the first time the transfer of many outstanding properties of the biological role models into innovative biomimetic products for reasonable costs. Presented examples include branched and un-branched fiber-reinforced light-weight composite materials, structural materials with a high energy dissipation capacity as fiber-reinforced graded foams and thin-layer compound materials, bioinspired high-load bearing adhesive as well as anti-adhesive materials and surfaces; and various bioinspired materials and structures with self-x-properties such as self-repairing structural materials and the biomimetic façade-shading systems flectofin® and flectofold inspired by the bird of paradise flower and the waterwheel plant, respectively.