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## CHALLENGES AND INNOVATION IN NEXT GENERATION NANOSCIENCE

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**T**he address will be based on our strong belief that the future of science in general and smart biomaterials and nanomedicines in particular is in the interdisciplinary approach to hypotheses formulation and problem solving. Nanoscience moved from copying/mimicking nature's design to modify it and designing bioactive materials. Our understanding of the relationship between structure and properties reached levels needed for the design of totally new materials different from those in nature. The latter approach has the highest potential for scientific and application breakthroughs in the near future. The nanomedicine field needs new ideas, so it can continue to enhance basic scientific knowledge and translate the laboratory and animal model work into humans. One new concept is called drug-free macromolecular therapeutics (DFMT). The design of DFMT is based on molecular biorecognition, which is at the center of all biological processes. Several therapeutic systems were designed that do not contain a low molecular weight drug, but their therapeutic efficacy is based on a combination of a macromolecule with a biorecognition domain. Biological activity is a result of one or more biorecognition events. The majority of studied systems are based on the crosslinking of receptors at the cell surface of blood cancer cells. Other systems target E-selectin receptors in the vasculature or focus on the biomineralization around cancer cells mediated by receptor – ligand recognition.

### Biography

Jindrich Kopecek received his PhD in Macromolecular Chemistry from the Institute of Macromolecular Chemistry (IMC) and DSc in Chemistry from the Czechoslovak Academy of Sciences (CAS), Prague, Czech Republic. He has done his Post-doctoral studies at the National Research Council of Canada. He served as Laboratory Head at IMC CAS and is currently, Distinguished Professor of Bioengineering and Distinguished Professor of Pharmaceutical Chemistry at the University of Utah. He serves on Editorial Boards of 14 international scientific journals. He is an elected member of the US National Academy of Engineering. His research interests are focused on biorecognition of macromolecules, bioconjugate chemistry, drug delivery systems, and self-assembled biomaterials. Hydrogels from his laboratory have been in clinical use and HPMA copolymer - anticancer drug conjugates in clinical trials. His Hirsch index is 87; his publications have been cited 26,900 times.

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