

## NANOTECHNOLOGY FOR GLOBAL EMERGING SCIENCE AND TECHNOLOGY SYSTEM

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### **Abstract**

The unifying, long-term vision of nanotechnology formulated about 1999-2000 has inspired the National Nanotechnology Initiative (NNI). A key challenge in the vision is seeding concepts and support for other emerging S&T fields, and this would become a focus after 2020. NNI involves over thirty U.S. research, development, and regulatory federal agencies with a cumulative public R&D investment of about \$40 billion by 2023 and over 70 international collaborations. NSF supports upstream research in all areas of nanoscale science, engineering, education, and innovation.

The presentation outlines how nanotechnology contributes with new discoveries, tools and solutions to the emerging S&T fields dealing with matter, energy and biosystems. The fastest growing contribution is in nano-biosystems, including molecular biology, synthetic biology, and nanomedicine. Nanotechnology provides a foundation for quantum information systems, wireless communication, semiconductors, and advanced manufacturing. Convergence of nanotechnology with modern biology, information, cognition, and artificial intelligence systems generates expanded opportunities to address compelling challenges such as efficient catalysts, personalized healthcare, clean energy, global change, and sustainability (<https://doi.org/10.1007/s11051-023-05829-9>).

**Bio note:** Mike Roco is the Senior Advisor for Science and Engineering at the National Science Foundation and founding chair of the U.S. National Science and Technology Council's subcommittee on Nanoscale Science, Engineering and Technology (NSET). Prior to joining the National Science Foundation, he was professor of mechanical and chemical engineering. Dr. Roco is credited with thirteen inventions, contributed over two hundred and fifty articles and twenty-one books. He was elected as the Engineer of the Year by the U.S. National Society of Professional Engineers and NSF in 1999 and again in 2004. Dr. Roco is member of the European Academy of Sciences and Arts, member of the Swiss Academy of Engineering Sciences, honorary member of the Romanian Academy, and Fellow of ASME, of Institute of Physics and of AIChE. He was awarded the U.S. National Materials Advancement Award in 2007 “as the individual most responsible for support and investment in nanotechnology by government, industry, and academia worldwide”, and received the IUMRS “Global Leadership and Service Award” at the EU

Parliament in 2015 for "vision and dedicated leadership ...that has made major impact to all citizens around the world."