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## Risk assessment, safety and sustainability by design

From a technology standpoint, nano-materials offer significant advantages due to their unique characteristics resulting from reduced dimensionality. Furthermore, advances in material synthesis have provided the means to control or even manipulate the transitional characteristics. Consequently, various "designer" materials with desired properties have recently been fabricated. Dual-use nature of technology coupled with the ability to functionalize with a plethora of biological configurations pose a significant safety and security concerns. Furthermore, a life cycle analysis of nano-materials is largely unknown and nano-materials resulting from the laboratories, manufacture, and even incidental events pose serious concerns. Notwithstanding such concerns, the beneficial uses of nano-materials offer a challenging scenario for policy-makers, researchers, and industrialists alike to propose and implement viable alternatives for sustainable development in terms of keeping up with the latest technological innovations, social responsibility and "being green". With so much at stake, it is prudent to challenge conventional wisdom and investigate a new set of strategies that employ a nexus of technological innovations, in conjunction with "acceptable" risk assessment and a strategic transformation in "use, reuse and recycle" as effective management tools to address "design safety, security and sustainability". "Sustainability by design" employs strategic transformations towards ensuring that humans and the environment can simultaneously flourish on the Earth. Authors have investigated life-cycle-assessment based on the characterization, assessment and management of risk to assess impacts on human and environmental health from a safety and sustainability standpoint. This presentation offers strategic solutions to a life cycle based approach to nano-materials and foresight tools, already developed by the authors, to offer possible solutions pathways. The development of a nano-materials safety data sheet (n-MSDS) is being researched by the authors as one such transformation tool needed to provide guidance on the impact of engineered and incidental nano-materials being introduced and recycled in our supply chain.

## Biography

Prof. Vaseashta received PhD from the Virginia Polytechnic Institute & State University in 1990. He is an experienced academic leader, administrator and researcher with over 12 years as administrator as Vice Provost, Director for two research institutes - Advanced Sciences Convergence and International Clean Water Institutes, and Director of Nanomaterials Processing and Characterization Laboratories. He served for over 18 years as an educator and 9 years in Government as Strategic Science & Technology advisor. He served as Director of several NATO Advanced Study Institutes and Advanced Research Workshops supported by NATO's Emerging Security Challenges Division of the Science for Peace and Security, and served as co-chair of an International Symposium on Nanotechnology & Environmental Pollution Prevention. With a large grants/contracts portfolio, he has an extensive international research and teaching collaboration network that has helped several students and faculty to enhance their research footprint and portfolio. He organized several NATO advanced research activities with international partners and has extensive international research and education collaboration and experience to enhance research footprint and portfolio using nexus of information, technology and knowledge. He authored over 200 research publications, edited/authored seven books on nanotechnology, presented many lectures worldwide and is listed as a much sought-after speaker.

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