

## BRIEF DESCRIPTION OF THE LECTURE

### **Lecture No. 1:** Importance of nanochemistry in industrial development

**The purpose of the lecture:** to determine the importance of modern nanochemistry in the development of global industry and fundamental discussion in the context of scientific research.

Nanotechnology is one of the most promising key enabling technologies of the 21st century. The field of nanotechnology was foreshadowed in Richard Feynman's famous lecture "There's Plenty of Room at the Bottom" in 1959, and the term was formally defined by Norio Taniguchi in 1974. Thus, the field is now close to 50 years of research and application. It is an ever-expanding field of research that contributes to almost every field of science - natural sciences and engineering, materials science, medicine, agriculture, information/communication technology, and the list is growing. Since the 1980s, nanotechnology has begun to influence and raise public awareness (including some controversy), and commercial applications of new technologies have begun. Now, as society faces complex, even dire challenges, we look to new technologies that provide solutions to almost every aspect of health, energy, climate, and the environment, directly or indirectly. In 2017, the United Nations made an urgent decision. The Sustainable Development Goals (UN SDGs) call on all countries to act to reduce inequality in all areas, recognizing that eradicating poverty and other deprivations goes hand in hand with improving health, the environment and the economy.

In November 2020, representatives from a group of leading nanotechnology research institutes gathered for a Virtual International Workshop on Nanotechnology for a Sustainable Future, focusing on how nanotechnology and its applications can address these goals, with speakers from five countries spanning four continents organized by the Waterloo Nanotechnology Institute at the University of Waterloo, Canada. One of the key outcomes here was the recognition of the need for an international network for sustainable nanotechnology (N4SNano) to find solutions to achieve this vision and create a global forum to invite others with new thoughts and ideas. The main focus of this network is to bridge the wide gap between scientists and technologists with governments and policymakers around the world to make the technology-based solutions that are so necessary to our current problems.

Some experts predict that nanotechnology will be the next industrial revolution, effective in various fields. Products supported by nanotechnology have found applications in many sectors. These include transportation, materials, energy, electronics, medicine, agriculture and environmental science, and consumer and household products. These applications can be grouped into medicine, food and cosmetics, agriculture, and the general categories of environmental health, technology, and industry (Fig. 1). Products obtained as a result of the use of nanotechnology are nanomaterials (for example, nanoparticles, nanocomposites, nanotubes, etc., nanosensors). With heavy investment in research and development of nanotechnology products, practical materials with unique applications will be developed. Therefore, it is very important that these technologies go beyond the confines of the laboratory and help solve pressing problems in society. As such, we should provide an overview of the considerations and protocols required to produce a competitive nanotechnology-derived product or business in the commercial marketplace.



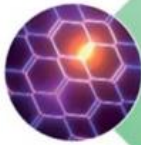
## Medicine

- Used for targeted drug delivery
- Useful in disease diagnosis, vaccine production etc.



## Food and Cosmetics

- Improving the bioavailability of nutrients
- As additives in creams, sunblocks etc.



## Agriculture and Environmental health

- Applications in water purification
- For pesticide delivery etc.



## Technology and Industry

- As additives in paints and coatings
- Production of semiconductors in nanorobotics etc.