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EDITORIAL

Nanotechnology Era of 2020: Environment and Agriculture

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Recent advances in nanotechnology are at the leading edge in the area of applied sciences. Nanoparticles with its characteristic dimension <100 nm possess unique physical and chemical properties are the building blocks for nanotechnology. In recent years nanomaterials, specifically metal nanoparticles, have received particular interest in diverse field of applied science ranging from material science to biotechnology[1-3]. Nanotechnology monitors a leading agricultural and environmental controlling process, especially by its miniature dimension. It improves the agriculture with novel nanotools by rapid disease diagnostic, enhancing the capacity of plants to absorb nutrients, increase in chlorophyll content. Nanoparticles boost up the rate of photosynthesis by improving LHC (Light Harvesting Complex) in plants.

Several researchers also classify hybrid nanomaterials composed of both bionanoparticles and synthetic nanoparticles as bionanoparticles[4-5]. In the later, these bionanoparticles are used together with non-biological nanoparticles to enhance their properties. The interest for BNPs has increased in the past years because they present very different properties and functions than synthetic nanoparticles and they tend to be more biocompatible than their inorganic non-biological counterparts.

The application of nanostructures and nanoparticles of biological nature is an emerging field. These nanoparticles of biological nature or produced by biological systems are typically classified as bionanoparticles (BNP)[6]. Applications of nanofertilizers and nanopesticides increase the productivity and protects against several insect pest and microbial diseases. Nanosensors are used for monitoring soil quality of agricultural field to maintain the health of agricultural plants. Hydrogels and nanoclays enhance the water holding capacity of soil as they act as a slow release source of water and reduces the hydric shortage. Organic and inorganic nanomaterials are used for the removal of contaminants from water, sewage, and air. Nanosensors improve detection and sensing of pollutants and helps in reduction of greenhouse gases. Carbon nanotubes are used to make windmill blades to increase the amount of electricity generated by each windmill. Oil spills are cleaned with the help of nanoparticles as they easily break down oil into biodegradable compounds. Apart from the usefulness of nanoparticles, they can cause some hazards for the environment from their production to their disposal. Heavy metal nanoparticles are rigid and stable so their degradation is not easily achievable, which leads to many environmental nanotoxicities.

The field of nanobiotechnology is the most active areas of research in modern materials science and technology. It provides the ability to create materials, devices and systems with fundamentally new functions and properties. Metals in nanometer size will exhibit special properties that differ from bulk metals. Silver is well known for possessing an inhibitory effect toward many bacterial strains and microorganisms commonly present in medical and industrial processes nanomaterials have potential applications in electronics and photonics, catalysis, information storage, chemical sensing and imaging, environmental remediation, drug delivery and biological labeling. It is well known that the optical, electronic, and catalytic properties of metal nanoparticles are greatly influenced by their size, shape and crystal structure. For example, silver (Ag) and gold (Au) nanocrystals of different shapes possess unique optical scattering responses[7].

REFERENCES

1. Guo, R., Song, Y., Wang, G., Murray, R.W., 2005. Does core size matter in the kinetics of ligand exchanges of monolayer-protected Au clusters? J. Am. Chem. Soc. 127, 2752–2757.https://doi.org/10.1021/ja044638c2221583ja
2. Daniel, M.C., Astruc, D., 2004. Gold nanoparticles: assembly, supramolecular chemistry, quantum-size-related properties, and applications towards biology, catalysis, and nanotechnology. Chem. Rev. 104, 293–346.https://doi.org/10.1021/cr030698+2221584ja
3. Huang, C.C., Yang, Z., Lee, K.H., Chang, H.T., 2007. Synthesis of highly fluorescent gold nanoparticles for sensing mercury(II). Angew. Chem. Int. Ed. 46, 6824–6828.https://doi.org/10.1002/anie.200700803**1562818ja**
4. Van Rijn P, Böker A (2011) Bionanoparticles and hybrid materials: tailored structural properties, self-assembly, materials and developments in the field. J Mater Chem 21:16735–16747.https://doi.org/10.1039/C1JM11433F114380op
5. Yang J, Yu J, Fan J, Sun D, Tang W, Yang X (2011) Biotemplated preparation of CdS nanoparticles/bacterial cellulose hybrid nano fibers for photocatalysis application. J Hazard Mater 189:377–383. DOI: 10.1016/j.jhazmat.2011.02.048 2221586ja

6. Thakkar KN, Mhatre SS, Parikh RY (2010) Biological synthesis of metallic nanoparticles. Nanomedicine 6:257–262. DOI: 10.1016/j.nano.2009.07.002499916ja

7. Roduner, E., 2006. Physics and chemistry of nanostructures: why nano is different. In: Nanoscience and Nanotechnologies. EOLSS.https://doi.org/10.1039/B502142C114381op