GREEN SYNTHESIS OF NON-SPHERICAL GOLD NANOPARTICLES FOR ANALYTICAL CHEMISTRY

Ruslan Mariychuk

Department of Ecology, Faculty of Humanities and Natural Sciences, University of Presov, 17th November str. 1, 08116, Presov, Slovakia

e-mail: ruslan.mariychuk@unipo.sk

Nanotechnology has undergone remarkable developments, resulting in new procedures for the controlled synthesis of a wide variety of nanoscale materials and measurement of their unique properties. Optical, electronic, magnetic, chemical, mechanical, and catalytic properties can often be tuned by the size, shape, and composition of the nanostructure. These unique properties and their generally high surface aria have led to their use in analytical chemistry.

The physicochemical properties of nanomaterials significantly depend on their morphology (size, shape and surface topography) and surrounding media. The systematic and precise correlation of these parameters with the relevant properties is a fundamental requirement for the discovery of novel properties and applications, as well as for the design and fabrication of new materials.

Metal nanoparticles are of great interest due to their specific function, determined by their composition, crystallinity, size, and shape. The last few years have witnessed remarkable attention to the synthesis of non-spherical metal nanoparticles. However, the existing methods for irregular shaped nanoparticle synthesis require a shape-directing surfactant which often is hazardous what is dramatic for biocompatibility of gold nanoparticles solutions. Therefore, nowadays controlled synthesis of metal nanoparticles with well-defined size and shape belongs to one of the most fascinating aspects of nanoparticle research.

Biological systems, e.g., plant extracts, have been already frequently used in the synthesis of metallic nanoparticles with the purpose to eliminate hazardous reagents. Such a green chemistry approach becomes an innovative way in the development of alternative protocols to prepare also much desired non-spherical nanoparticles. In plant extracts, a vast number of substances or group of components can work both as reducing and capping agents in the synthesis of nanoparticles. The existing number of plant species gives infinite possibilities in this field.

Recent progress of the developments in the green synthesis of non-spherical gold nanoparticles through the bio-reduction of tetrachloroauric acid using leaf extracts of selected plants (lemon balm, peppermint, juniper etc.) will be presented.