

9th World Congress on

Chemistry and Medicinal Chemistry

May 13-14, 2019 | Prague, Czech Republic

Silver and copper nanoparticles by the pulsed plasma in liquid and their antibacterial properties

Emil Omurzak

Kyrgyz-Turkish Manas University, Kyrgyzstan

One of the most important properties of silver nanoparticles is their antimicrobial action against several bacteria, fungi, and viruses. Surprisingly, nano Ag are safe and non-toxic to human and animal cells at low concentrations because the possible toxicity of silver nanoparticles to the environment is considered extremely low as compared to other materials.

Silver and copper nanoparticles were prepared by using pulsed plasma in liquid method. This is a low voltage pulsed spark discharge in a dielectric liquid. The electrodes of about 2 mm in diameter and about 10 mm in length made of pure silver rods were submerged in a 50 ml pyrex beaker filled with deionized water and plasma (200 V, 50 A (peak), 10 μ s) was generated between the silver electrodes for about 15 min. Polyvinylpyrrolidone (PVP), Cetyl trimethylammonium bromide (CTAB), Sodium n-Dodecyl Sulphate (SDS) were used as a stabilizing agents.

The XRD spectra of the prepared samples indicated the face-centered cubic crystalline structure of metallic silver nanoparticles. Spherically shaped silver nanoparticles of diameter 2.2 ± 0.8 nm were synthesized by the pulsed plasma in aqueous solution with PVP surfactant. Similarly, silver nanoparticles of diameter 1.9 ± 0.4 nm size were obtained with SDS surfactant. *In vitro* antibacterial properties of all the synthesized silver nanoparticles

against the Gram-negative bacteria *Escherichia coli* were examined by Kirby–Bauer disk diffusion susceptibility method. It was noticed that the stabilized with SDS silver nanoparticles demonstrated a better antibacterial activity against bacterial strains as compared to the silver nanoparticles stabilized with PVP, CTAB.

Speaker Biography

Emil Omurzak, Dr. Industrial Engineering, graduated from Physics and Electronics Department, Kyrgyz State National University in 2002. He worked for the National Academy of Sciences of Kyrgyzstan in 2002 – 2004 at the Institute of Physics, Laboratory of Plasma Technologies and Institute of Chemistry and Chemical Technology, Laboratory of Nanotechnology as scientist. From 2004 until 2008, he studied PhD course at the Kumamoto University, Graduate School of Science and Technology and obtained Doctor of Engineering degree in 2008 for the dissertation work “Synthesis of Nanomaterials by Impulse Plasma in Liquid”. After that he worked as postdoctoral fellow at the central laboratory of Kumamoto University Innovation Collaboration Organization. From 2009 to 2015, he worked as specially appointed Assistant Professor at the Kumamoto University. Since 2015, he is Assistant Professor of the Chemical Engineering Department, Faculty of Engineering, Kyrgyz-Turkish Manas University. He has published more than 30 papers and 10 patents. His research is focused on the synthesis of nanomaterials by the pulsed plasma in liquid method and studying their physical and chemical properties for bio-medical, physical, chemical applications.

e: emil.omurzak@manas.edu.kg Notes: