

Comprehensive Study on Toxicology of Surface-Coated ZnO Nanoparticles in Human Alveolar Adenocarcinoma Cells

Nirmalya Tripathy¹, Ahmad Rafiq¹, 김진환², 한윤봉^{2,1,*}

¹전북대학교 BIN 융합공학과; ²전북대학교 화학공학과
(ybhahn@chonbuk.ac.kr*)

The impact of surface coating of zinc oxide nanoparticles (ZnO NPs) with chitosan, cell culture medium and oleic acid (OA) on their cytotoxicity in human alveolar adenocarcinoma (A549) cells has been studied in terms of particle induced-toxicity, membrane damage, generation of intracellular reactive oxygen species (ROS), and cell apoptosis. The chitosan-coated NPs with negatively charged hydroxyl group are less toxic than OA-coated NPs with positively charged alkyl groups, thereby highlights its potential for reducing metal oxide NPs toxicity. The potential of surface coatings to reduce the cytotoxicity was ordered as chitosan- > medium- > OA-coated. The reduction in the cytotoxicity of surface-coated ZnO NPs was attributed to lesser interaction of NPs with the cells and decrease in Zn²⁺ ions into the cell medium, resulting in decrease of ROS production and apoptotic cell death. The mechanism involved in the cytotoxicity of ZnO NPs was also studied in detail.