

Ligand-Depended Adsorption Characteristics of Silver Nanoparticles on Activated Carbon

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Abstract : Surface modification and functionalization has been an important tool for scientists in order to open new frontiers in nano science and nanotechnology. Desired surface characteristics for the intended applications can be achieved with surface functionalization. In this work, the effect of water soluble ligands on the adsorption capabilities of silver nanoparticles onto AC which was synthesized from German beech wood, was investigated. Sodium borohydride (NaBH₄) and polyvinyl alcohol (PVA) were used as the ligands. Silver nanoparticles with different surface coatings have average sizes range from 10 to 13 nm. They were synthesized in aqueous media by reducing Ag (I) ion in the presence of ligands. These particles displayed adsorption tendencies towards AC when they were mixed together and shaken in distilled water. Silver nanoparticles (NaBH₄-AgNPs) reduced and stabilized by NaBH₄ adsorbed onto AC with a homogenous dispersion of aggregates with sizes in the range of 100-400 nm. Beside, silver nanoparticles, which were prepared in the presence of both NaBH₄ and PVA (NaBH₄/PVA-Ag NPs), demonstrated that NaBH₄/PVA-Ag NPs adsorbed and dispersed homogeneously but, they aggregated with larger sizes on the AC surface (range from 300 to 600 nm). In addition, desorption resistance of Ag nanoparticles were investigated in distilled water. According to the results AgNPs were not desorbed on the AC surface in distilled water.

Keywords : Silver nanoparticles, ligand, activated carbon, adsorption

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