

**Choma, J., Jamiola, D., Jaroniec, M. Synthesis and Physicochemical Properties of Carbon-silver Core-shell Structures. *Ochrona Srodowiska* 2012, Vol. 34, No. 4, pp. 3–8.**

**Abstract:** Carbon spheres were used as cores for the deposition of silver nanoparticles leading to the formation of carbon-silver core-shell structures. These spheres, with diameters ranging from 450 to 550 nm, were prepared by the modified Stöber method from phenolic resins, which at the final stage of the process were carbonized at 600 °C in an inert atmosphere for 4 hours. In order to facilitate the deposition of silver nanoparticles, the carbon spheres were made subject to oxidation with nitric acid, followed by modification with 3-aminopropyltrimethoxysilane, to attach aminopropyl groups. The deposition of silver nanoparticles onto the modified carbon spheres was a two-stage process. At the first stage silver cations were reduced by  $\text{Sn}^{2+}$  cations adsorbed on the modified carbon spheres, in the presence of ammonia water. At the second stage silver nanoparticles were deposited by reducing silver cations with formaldehyde. This deposition led to full coverage of the carbon spheres by non-uniform silver nanoparticles (50–100 nm). Scanning electron microscopy has revealed that the extent of coverage depends on the ratio of the mass of silver nitrate to the mass of carbon used. The resulting carbon-silver core-shell structures show a significant absorption of UV-Vis radiation (320 to 80 nm).

**Keywords:** Carbon-silver structures, core-shell structures, synthesis, deposition, silver, SEM, UV-Vis spectra.