A simple method to generate spontaneous chemisorption of metallic particles mediated by carboxylate

Abstract

He present work describes oligomeric poly(amide-imide)s (PAIs) containing several L-amino acidic residues and two silicon atoms in their repeat unit, whose carboxylate terminal group was chemisorbed onto metallic particles (Cu, Ag or Au) previously deposited in controlled conditions via physical vapor deposition. Thus, for each prepared polymer–metallic hybrid, the surface morphology, particle size distribution, and percentage of organic material, silicon and metal were studied using scanning electron microscopy and energy-dispersive X-ray spectroscopy. The results show that the hybrids are formed probably via electrostatic interaction between the carboxylate anions of the PAIs and nanoparticle cations. This bridging ligand was visualized using Raman spectroscopy and corroborated with X-ray diffraction. Optical studies and resistivity measurements (conductivity) of each hybrid were developed using UV-visible and the four-point probe method, respectively. X-ray photoelectron spectroscopy was used to study the oxidation states of the metallic particles at surface level. Thus, a simple and spontaneous protocol is proposed for the preparation of metallic particles stabilized *in situ* by an oligomer, a procedure that takes place from seconds to a few minutes. Finally, particle diameters were measured using atomic force microscopy in order to study possible agglomeration of the metallic particles with time.