POLYANILINE/(Au-Pd) COMPOSITE

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Composites based on polyaniline (PAn) occupy a prominent place in both electronics and catalysis. Quite good conductivity and stability, redox properties and fast response to changes in the pH of the environment make PAn an extremely popular component of many PAn/Me composites. Among researchers, composites of PAn with noble metals such as gold (Au) and palladium (Pd) are particularly popular. Metal nanoparticles can be easily incorporated into the polyaniline matrix using a one-step redox mechanism due to the appropriate oxidation potential of the metals for monomer polymerization.

The PAn/(Au-Pd) nanocomposites were synthesized by mixing solutions of 0.4 mL of 1.0 M $K_2[PdCl_4]$ with 1.6 ml of 0.11 M $HAuCl_4$ and 3.0 ml of a suspension of previously synthesized leucoemeraldine. The resulting green-black precipitate was washed with distilled water on a paper filter to a neutral pH of the washings and then dried in air. Scanning electron microscopy (SEM), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and X-ray energy dispersive analysis (EDX) were used to analyze PAn/(Au-Pd).

Analysis of the SEM image of the PAn/(Au-Pd) sample (Fig. 1, *a*) showed that the composite has a granular morphology with a fairly uniform distribution of Au and Pd particles in the polymer matrix. Nanoscale spherical PAn particles are aggregated into microsized (<1 μm) granules of nearly spherical shape.

The X-ray diffraction pattern of the PAn/(Au-Pd) composite (Fig. 1, *b*) contains four intense diffraction peaks at 2θ = 38.0; 44.0; 65.0 and 78.0°, which correspond to Au. The diffraction peaks observed at 2θ = 14.5; 20.4 and 25.2° belong to the emeraldine salt of PAn and indicate its amorphous-crystalline state. Reflections characteristic of Pd were not detected, which is attributed to the formation of a solid solution of Pd in Au. The EDX spectrum contains peaks corresponding to Au and Pd (Fig. 1, *c*).

The FTIR spectrum of the PAn/(Au-Pd) sample (Fig. 1, *d*) contains characteristic bands typical of PAn. The quinoid and benzenoid peaks of PAn are observed at 1 554 and 1 484 cm^{-1}, respectively. The main transmission bands are slightly shifted to the red region of the spectrum, compared to the corresponding characteristic bands of pure PAn.

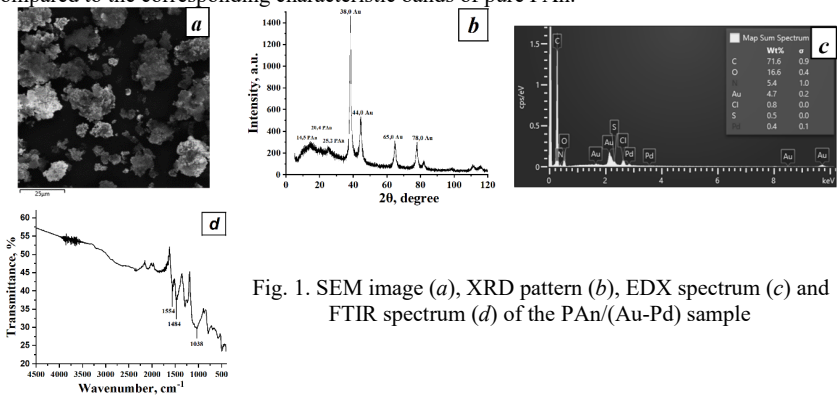

Fig. 1. SEM image (*a*), XRD pattern (*b*), EDX spectrum (*c*) and FTIR spectrum (*d*) of the PAn/(Au-Pd) sample

Thus, as a result of chemical synthesis, the PAn/(Au-Pd) nanocomposites were obtained and characterized. It can serve as a promising electrode material for electrochemical syntheses.