2006

International projects

- **"Investigation on Electrochemically Manufactured Materials and Their Tribological Properties Applying Them for Micro- and Nanotechnology Products"** (2006–2008), Project of INTAS Collaborative Call with Moldova 2005

The project was carried out together with Katholieke Universiteit Leuven (Belgium), Vilnius University (Lithuania), Ecole Centrale Paris (France), Institute of Applied Physics of Academy of Sciences of Moldova, V. I. Vernadsky Institute of General & Inorganic Chemistry (Ukraine).

This project was directed to continue and to intensify the research activity resulting in developing methods for the electrochemical deposition of Co-Mo, Co-W, Fe-Mo, Fe-W, Co-Mo-P, Fe-Mo-P, Fe-W-P, Co-W-P rich-in-tungsten/molybdenum alloys in the amorphous/nanocrystalline state under direct and pulse current deposition mode. Developed coatings possess a set of characteristics such as superior mechanical and tribomechanical, chemical (oxidation and corrosion resistance) properties, and high smoothness allowing an increase in the applicability of the obtained alloys in the micro- and nanotechnology, especially in microelectronics, micromachining and MEMS.

National projects

- **"Silver Nanoparticles in Polymers"** (2006), funded by the Lithuanian State Science and Studies Foundation, No. T-06064

Silver colloid was produced by chemical reduction of silver salt (silver nitrate $AgNO_3$) solution. As a reducer, sodium citrate was used. UV-VIS spectrometry indicated formation of nanoparticles. The surface plasmon resonance peak in absorption spectra of silver colloidal solution showed an absorption maximum at 450 nm. Comparison of theoretical (Mie light scattering theory) and experimental results showed that diameter of silver nanoparticles in colloidal solution is about 100 nm. Silver nanoparticles were deposited on two substrates: silica (SiO_2) and polyethylene terephthalate (PET) modified with various polymers (polycarbonate (PC), polymethyl methacrylate (PMMA), polystyrene (PS)). The colloidal silver was incorporated by dip-coating to the polymer-substrate structures. X-ray fluorescence spectroscopy (XRFS) and atomic force microscopy (AFM) results indicate that produced structures include silver nanoparticles. It was found that during deposition, silver nanoparticles forms aggregates on the surface. The size of aggregates varied from 240 nm to 400 nm.

Self-supporting projects

- **"Thin Films Formation from Water Dispersions by Ni Coated Anilox Rolls"** (2006), research contract No. G-06089 with company EMKA, funded by Lithuanian State Science and Studies Foundation

Electrolytic Ni coatings were used for the steel anilox roll surface forming. Anilox rolls were adopted for the forming of thin films from water dispersions.

- **"Development of Methodology to Calculate Measurement Uncertainties and Preparation of the Project Documentation"** (2006), research contract with company Blue Bridge

Common procedure of uncertainty analysis was reviewed. Sources of errors and their distributions were identified. Procedures for evaluation of impurity concentration in water, ammonium ions identification by spectrophotometry, lead identification in the soil by atomic absorption spectrometry were described.