s8.m28.p10 **Electrocrystallization of Pt on Au Substrates. XRD Study.** Irina Yu. Molina, Ludmila M. Plyasova, Elena R. Savinova, *Boreskov Institute of catalysis, Russia. E-mail: molina@catalysis.nsk.su*

Keywords: X-Ray powder diffraction; Nanoparticles; Electrolitic deposits

To determine structural features responsible for adsorption characteristics and catalytic activity of highly dispersed electrodeposited catalysts, systematic X-ray diffraction study of the real structure of Pt electrodeposited on Au substrates was carried out. The influence of the deposition potential, electrochemical aging, model catalytic reactions and the texture of the Au support on the structural features of deposits have been analyzed. The samples were prepared via potentiostatic electrodeposition of Pt from H_2PtCl_6 onto Au substrates. Deposition potential was varied in the range from 0.550 to 0.025 V. Amount of electrodeposited Pt was 0.5-1 mg/cm^2 and the estimated thickness varied from 0.20 to 0.80 mkm. It has been shown that under the conditions employed highly defective electrolytic deposits are formed composed of nm-sized particles (8-20 nm). The structure of Pt nanoparticles is highly distorted which is expressed in rather high values of strains and decrease of lattice parameter. The grain size and lattice parameter decreases with an increase of the deposition potential while the strains increase. It has been shown that electrochemical aging and model electrochemical reactions lead to the relaxation of the defect structure of electrodeposited Pt, which is expressed in an increase of lattice parameter and particle size. The abrupt decrease in the values of strains is observed for more defective samples obtained at low overvoltage (0.250 - 0.550 V). It also has been shown that the texture of Au support (samples with <200>, <311>, <220> Au texture were investigated) has no significant influence on the crystallographic orientation of Pt deposits. The differences in structural features for samples on textured supports are much weaker than that for deposits obtained on the identical supports but at different deposition potentials. The average particle size for Pt on the textured supports is 11-15 nm, all samples under investigation have practically equal values of lattice parameter and strains, and agree well with the early studied samples, obtained at the same deposition potential (0.300 V). Thus the data obtained shows that deposition potential is a key parameter determining structural characteristics of Pt electrodeposits. The work was supported by the Russian Foundation for Basic Research (projects N 01-03-33132, N 03-03-06348).

s8.m28.p11 **The Formation of Nanocrystalline Structure in Amorphous Fe-Si-B Alloy by Severe Plastic Deformation.** G.E. Abrosimova[1)], A.S. Aronin[1)], S.V. Dobatkin[2)3)], I.I. Zver'kova[1)], S.D. Kaloshkin[3)], D.V. Matveev[1)], O.G. Rybchenko[1)], E.V. Tatyanin[2)4)]. [1)]*Institute of Solid State Physics RAS, Chernogolovka, Moscow district, Russia,* [2)]*Institute of Metallurgy and Materials Science RAS, Moscow, Russia,* [3)]*Moscow State Institute of Steel and Alloys, Moscow, Russia,* [4)]*Institute of High Pressure Physics RAS, Troitsk, Moscow district, Russia. E-mail: orybch@issp.ac.ru*

Keywords: Nanocrystalline structure; Severe plastic deformation; Phase transitions

The appearance of bulk metallic glasses caused a renewed interest to amorphous metallic materials. Last years metallic glasses have attracted the interest as a precursors for production of nanocrystalline state. Nanocrystalline structure created by primary crystallization of melt-spun amorphous Fe-based ribbons exhibits excellent soft magnetic properties. Practical application of nanocrystalline ribbons is limited by small thickness of samples therefore new method of nanocrystalline structure formation in bulk alloys should be developed. A possibility of nanocrystalline structure formation under severe plastic deformation is studied in this research.

The structure evolution of melt-spun amorphous alloy $Fe_{81}B_{13}Si_6$ under a severe plastic deformation at room and high temperatures has been studied. The formation of nanocrystalline structure in this alloy by usual annealing is unknown. The samples were prepared as ribbons with a section of 0.24 x 3 mm. The plastic deformation was curried out at a number of temperatures: 20°, 200° and 400° C by high pressure torsion. The phase transitions during the crystallization, morphology, structure and size of crystals were studied by differential scanning calorimetry, transmission electron microscopy and X-ray diffraction.

The nanocrystalline structure was found to form at achievement of definite deformation degree. The phase composition, crystal size, morphology and distribution of crystals in the sample depend on a degree of plastic deformation and treatment temperature. The minimal size of obtained crystals is 5-10 nm. Specific features of the structure and structure evolution are discussed.