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

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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/sm^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).