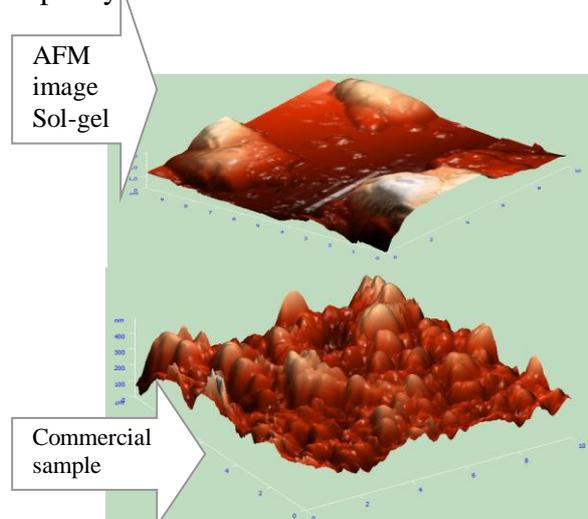


The effect of UV treatment on the properties of TiO₂ with gold additives

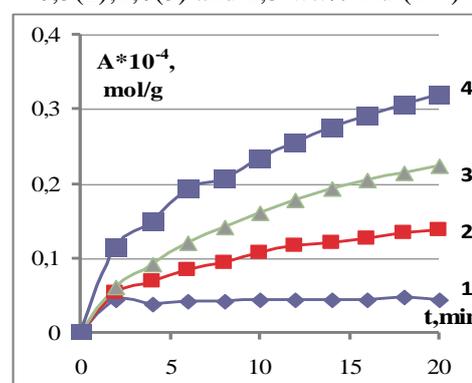
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Ultrafine TiO₂ powders were prepared after crystallization of organogels at 500 °C. All samples, synthesized in various precursors ratio, were monofased of anatase (AN) type only and showed the augmentation of paramagnetic centers number (ESR data) and changes of surface morphology (AFS) after UV irradiation not more than 3 minutes. The gold introduction increased the surface acidity, tested by pyridine adsorption (PyA). The linear correlations between Au content and the rate of PyA, as well as total PyA were obtained. After UVT the adsorption capacity decreased.



Pyridine adsorption kinetics on AN with 0(1); 0,5(2);1,0(3) and 1,5 wt.% Au (1-4)



If during the adsorption experiment the Py solution in octane with Au-doped TiO₂ is exposed in UV light the rate of PyA augments in 2 times in compared with dark conditions. This effect is not observed for samples without Au and with 1.5 % wt. of Au. So, photoactivated Py adsorption depends on the surface composition of oxide, that is confirmed by our previous results. For supported Ag, Cu, Au additives the highest stimulation for adsorption of donor molecule was obtained for Au/TiO₂(AN). As in case of photocatalysis the reason of such stimulation is connected with holes (h⁺) formation that react with adsorbing molecules. The influence of UV-treatment of Ag, Cu, Au/TiO₂ was studied for catalytic reactions of ethanol in flow conditions [1]. After UV irradiation of TiO₂ and Ag/TiO₂ the yields of acetaldehyde and ethylene respectively increase, but for Cu/TiO₂ catalyst, on the contrary, decrease.

References

1. Do Tkhyui Mai, I.I. Mikhaltenko, A.I. Pylinina. Russian Journal of Physical Chemistry. (2014) 88 (10)