

The organic compounds and drugs photocatalytic decomposition in water solution on Ti-implanted nanoscale layers

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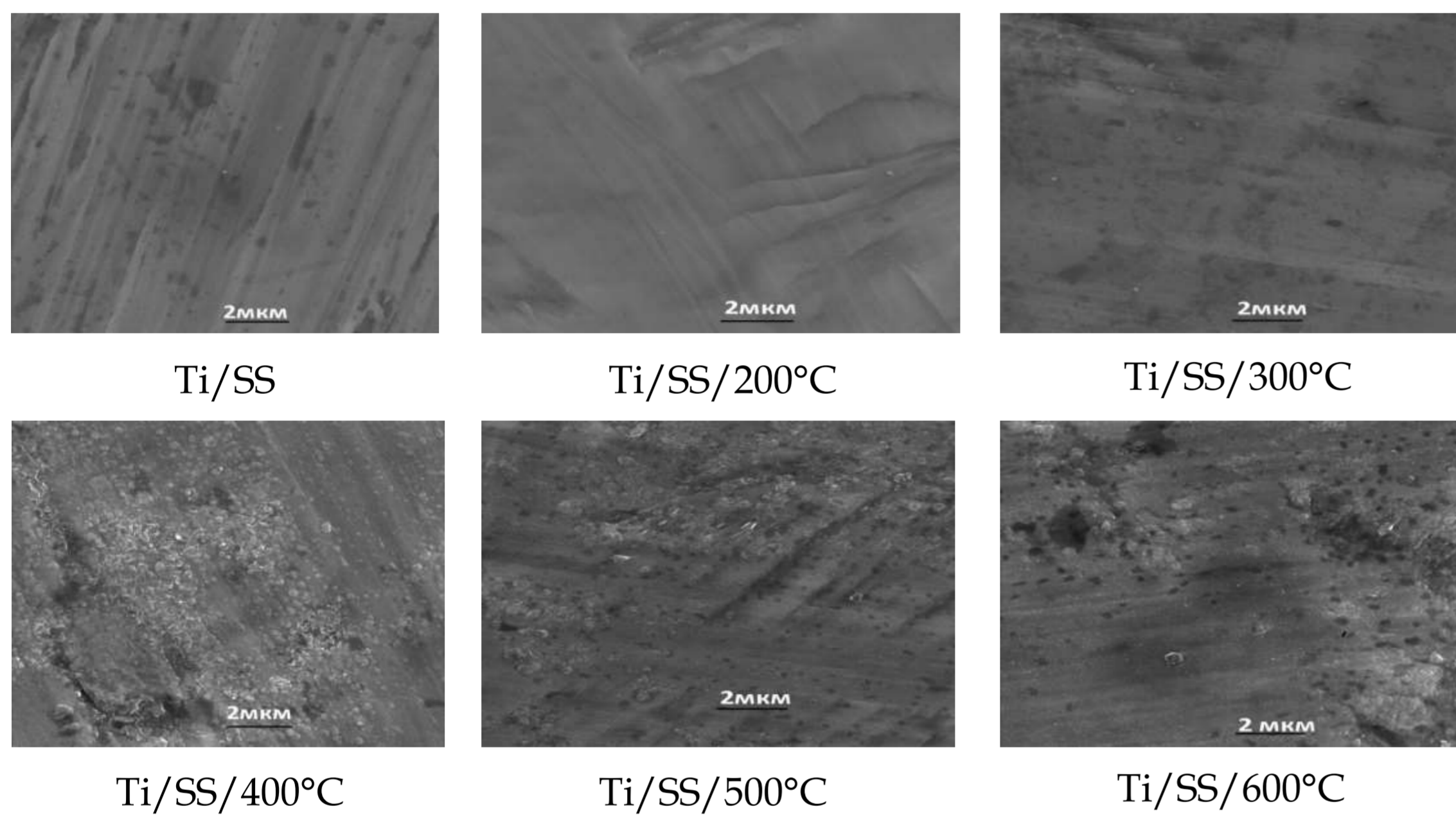
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Modern technologies in chemistry are developing in the direction of obtaining new materials, increasing the efficiency of technological processes, improving their environmental parameters, etc. Nanotechnologies, in particular nanocatalysis, contribute significantly to this.

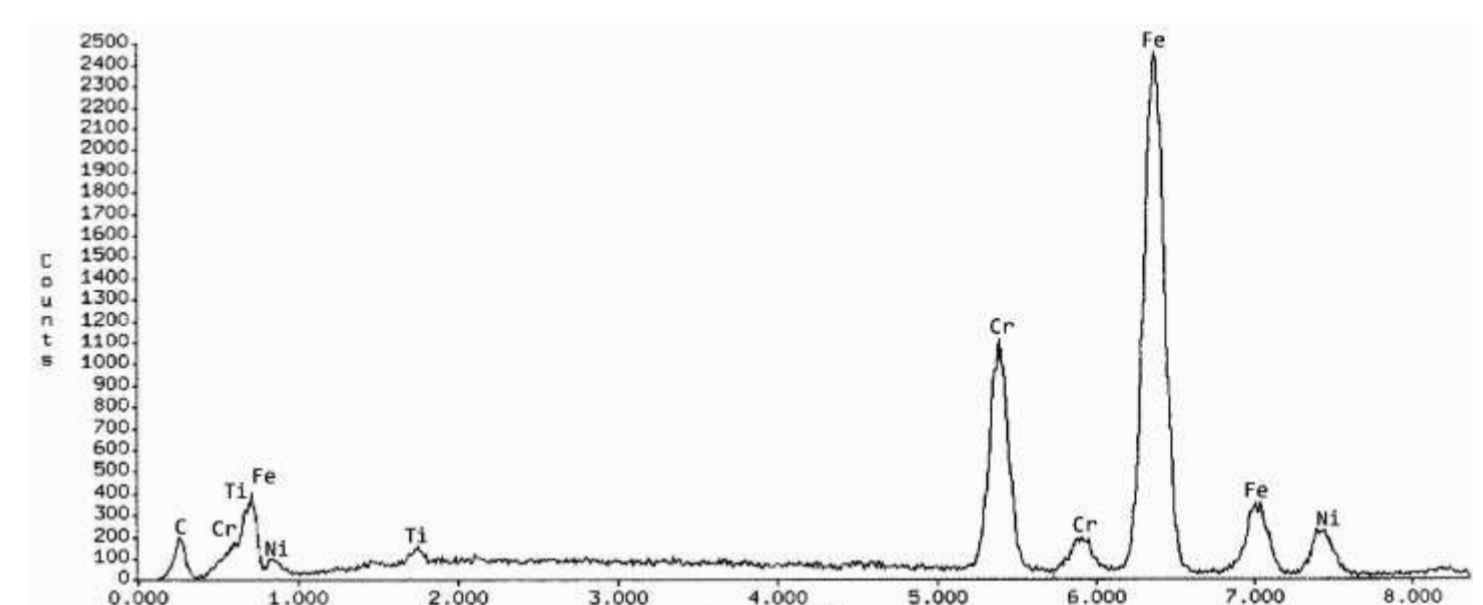
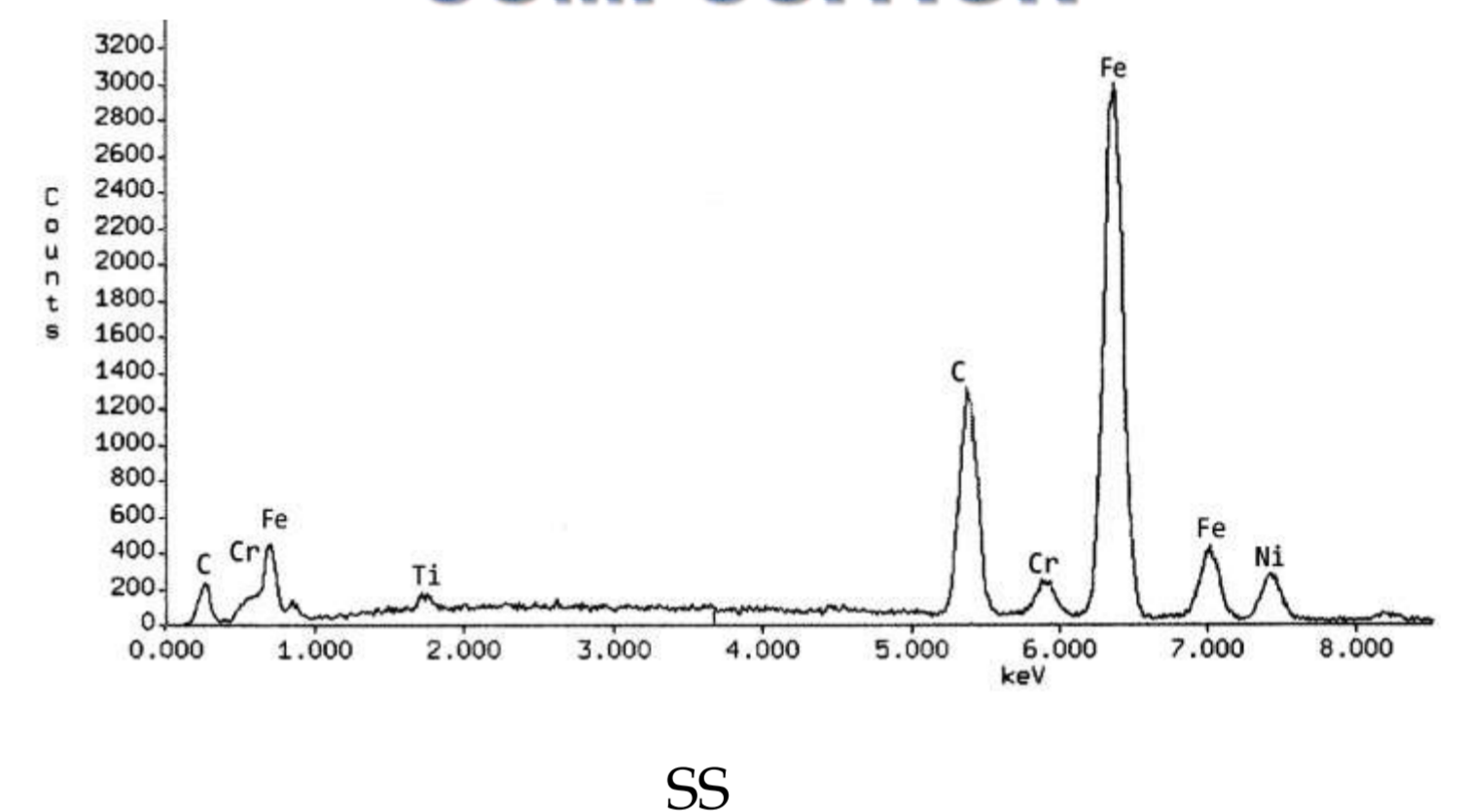
To obtain nanoscale catalytic layers, the technology of ionic implantation was used. [1]. Titanium and nitrogen ions were accelerated to energies of 20 keV and bombarded the surface of the stainless steel foil. The maximum penetration depth was about 150 nm. The operating mode was chosen for the preparation of Ti-ions content in the surface layer near to 5×10^{17} ion/cm². The prepared samples were treated at different temperatures up to 600 °C. The properties of prepared composites were studied by means of XPS, XRD, SEM, AFM and SAXS methods.

The catalytic properties of the samples were studied in the reactions of photocatalytic degradation of organic compounds (benzene and methanol) and some drugs (paracetamol and chloramphenicol) in aqueous solutions both in the visible range and in ultraviolet radiation.

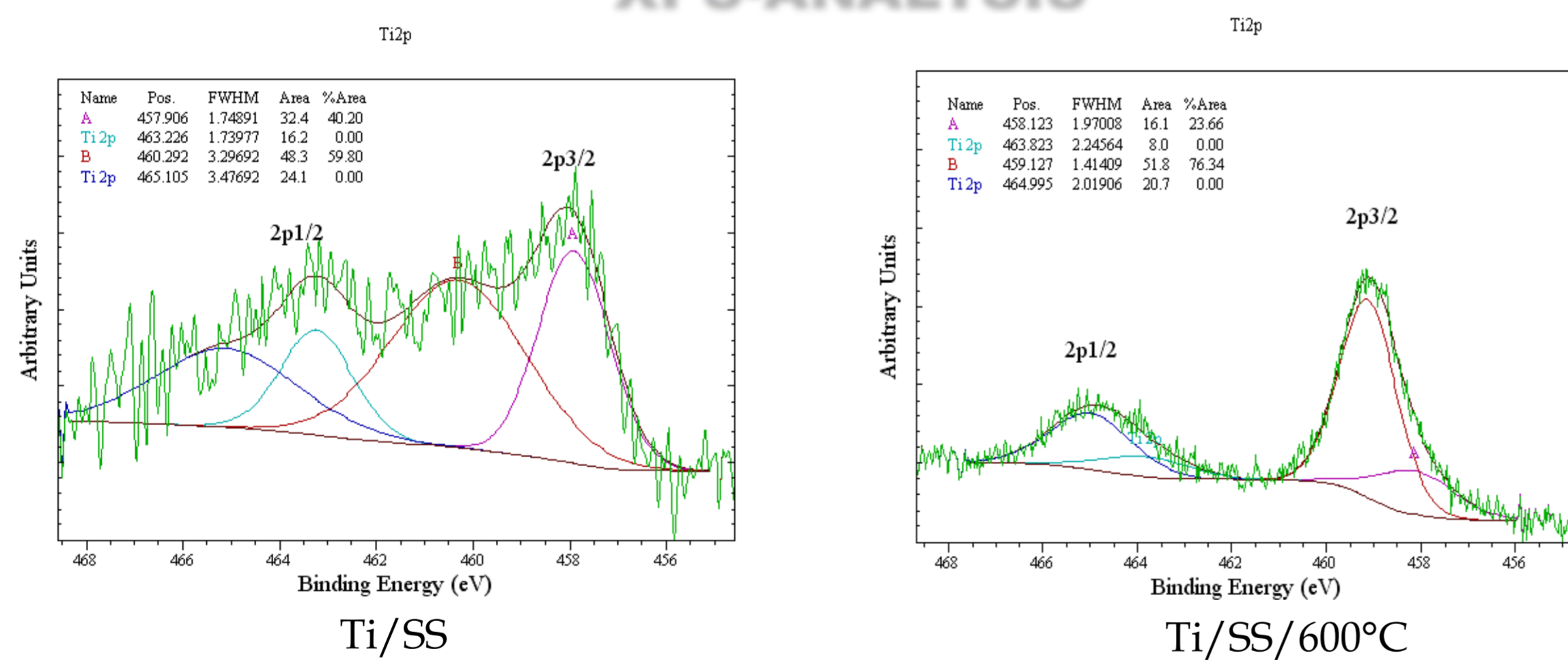
SEM -ANALYSIS



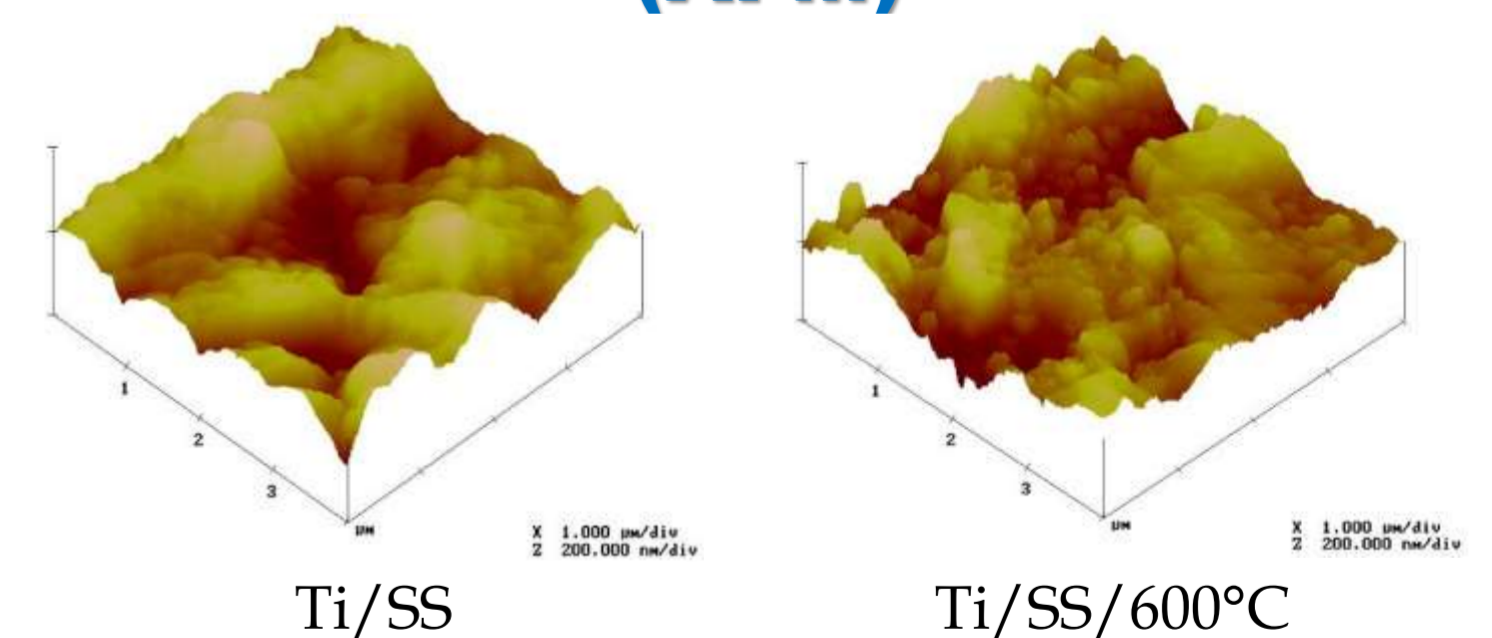
RESULTS OF MICROANALYSIS OF THE SURFACE COMPOSITION



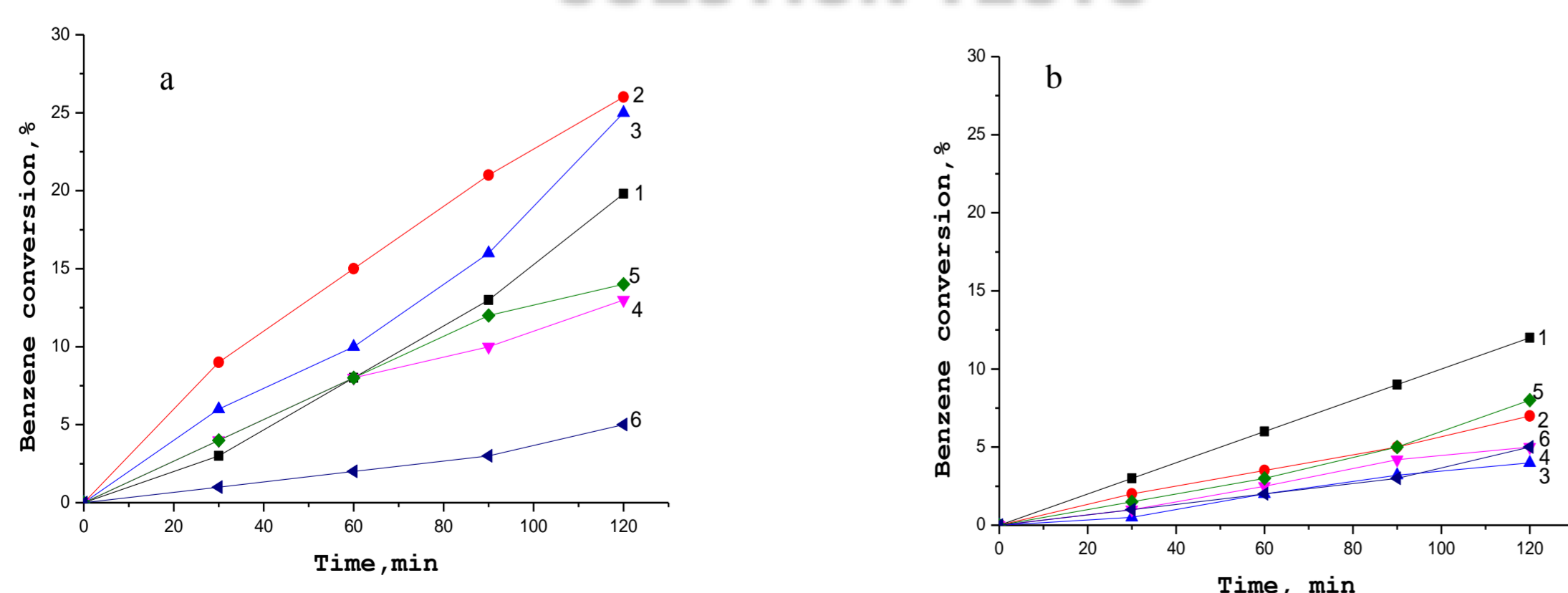
XPS-ANALYSIS



THE SURFACE MORPHOLOGY (AFM)



PHOTODEGRADATION OF AQUEOUS BENZENE SOLUTION TESTS



a – visible light irradiation, b – UV irradiation;

1- Ti/SS; 2- Ti/SS/200°C; 3- Ti/SS/300°C; 4- Ti/SS/400°C; 5- Ti/SS/500°C; 6 – Ti/SS/600°C

REFERENCES

1. Zazhigalov V. O., Honcharov V. V. The formation of nanoscale coating on the 12Cr18Ni10Ti steel during ion implantation // Metal Physics and Advanced Technologies-2014.- 36, N 6.-P. 757–766.

CONCLUSIONS

It has been shown that prepared samples demonstrated high activity in photocatalytic oxidation of these compounds and the activity at visible region is much more than at UV-irradiation. It was established that activity of the samples determined by their pretreatment temperature. It was shown that activity of the sample is connected with the existence of ion nanosized amorphous layers based on titanium and nitrogen (nitrides, oxynitrides) and is determined by the ration of these compounds.

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