



*National Technical University
“Kharkov Polytechnic Institute”
Department of Chemical Technology of Inorganic Substances,
Catalysis and Ecology*

Proposal
for cooperation

of Department of Chemical Technology of Inorganic Substances, Catalysis and Ecology

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Our Fields of Research

We are interested in cooperation in the fields of:

- **Waste Treatment**

- Calcium carbonate nanopowders production by utilization of liquid wastes of soda ash production
 - Reducing of greenhouse gas emission
- (we would like to start cooperation with [Institute of Fluid Dynamics and Thermodynamics \(ISUT\)](#), [Institute of Process Engineering \(IVT\)](#))

- **Technology of mineral fertilizers**

- Scientific fundamentals of technology of new generation chlorine-free potassium fertilizers
- (we would like to start cooperation with [Institute of Process Engineering \(IVT\)](#))

- **Solar cells**

- Technology of chemical deposition of thin films of cadmium sulfide



Our Developments

- **Reducing of greenhouse gas emission.**

For many years we have been developing methods to reduce emissions of (to MAC standards) one of greenhouse gases – nitrous oxide that is 310 times more powerful than CH_4 . We carried out the research and created the bank of the physicochemical process data of catalytic N_2O reduction by ammonia and kinetic model of this process. Catalysts and technologies have been also developed, issued guidelines for the industrial implementation and the use. Work can be used in various industries: chemical, metallurgical, in heat-power engineering, automotive, agro-chemical complex. At the same time we developed a method and technology of nitrous oxides production that can be used in oxidizing processes of organic compounds.

We are looking for partners for joint projects, which are very important for the activity against global warming.

- **Scientific fundamentals of technology of new generation chlorine-free potassium fertilizers.**

The aim of the project is the development of fundamentals of optimal energy-saving waste-free technology of potassium carbonate (potash). It has a wide application as a chlorine-free potassium fertilizer, raw material for inorganic and organic compounds, a component of a batch mixture for glass production and as an accelerator of concrete hardening.

Nowadays, the world's potash production capacity exceeds 300000 tons/year. The main production method is based on electrolysis of potassium chloride solutions. This method is very energy-intensive (energy consumption exceeds 2.000 kWh/ton in addition to costs of evaporation of potassium solution). A method based on the use of amines as an intermediary in the synthesis of potash from potassium chloride is more energy-efficient, but this technology of chlorine-free potassium fertilizer is not implemented on an industrial scale.



Our Publications

1. Gryn G. Photoelectric characteristics of units based on cadmium sulphide / G. Gryn, A. Pancheva, S. Adamenko // The Bulletin of BSTU. named after V.G. Shukhov – Belgorod: BSTU. – 2015. – № 1.– p.155–158.
2. Savenkov A. Hydrothermal Synthesis of Steady-State Zirconium (IV) Oxide. / A. Savenkov, A. Ogurtsov, O. Bliznyuk, A. Khlopitsky // Chemical and Materials Engineering, 2014, № 2, p. 44–46.
3. Gryn G. Chemical equilibrium in reactions of thermal decomposition of nitric acid / G. Gryn, P. Kuznetsov, V. Ponomarev, A. Loboyko // Chemical technology. – Moscow: Science and technologies.– 2013.– № 10.– p.140-150.
4. Savenkov A. Math simulation of the ammonia oxidizing process on a platinum catalyst taking into account N_2O formation / A. Savenkov, O. Bliznyuk, P. Kuznetsov, Vyatkin Y., Masalitina N. / Russian Journal of Applied Chemistry – 2015. – Vol.88, № 10– p.14–19.