Boreskov Institute of Catalysis
of the Siberian Branch of Russian Academy of Sciences, Russia
Russian Scientific and Cultural Center in Vienna, Russia
Federal Agency «Rossotrudnichestvo», Russia
Ministry of Education and Science of the Russian Federation
European Federation on Chemical Engineering
Scientific Council on Theoretical Fundamentals of Chemical Technology RAS
Scientific Council on Catalysis RAS

EFCE CONFERENCE
Event 691

XIX International Conference on Chemical Reactors CHEMREACTOR-19

Vienna, Austria
September 5 – 9, 2010

ABSTRACTS

Novosibirsk, 2010

INTERNATIONAL SCIENTIFIC COMMITTEE

Valentin N. Parmon, **Chairman**	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Alexander S. Noskov, **Vice-Chairman**	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Dmitry Yu. Murzin, **Vice-Chairman**	Åbo Akademi University, Turku, Finland
David Agar	University of Dortmund, Germany
Sergey Alekseenko	Institute of Thermophysics SB RAS, Novosibirsk, Russia
Alex Bell	University of California, Berkeley, CA, USA
Valentin A. Borodulya	A.V. Luikov Heat and Mass Transfer Institute NAS of Belarus, Minsk, Belarus
Jeffery Bricker	UOP LLC, USA
Raghunath Chaudhari	National Chemical Laboratory, Pune, India
Ben A. Christolini	UOP LLC, USA
Jiří Drahoš	Academy of Sciences of the Czech Republic, Prague, Czech Republic
Mike P. Duduković	Washington University, St. Louis, USA
Gerhardt Eigenberger	Stuttgart University, Germany
Pio Forzatti	Technical University of Milan, Italy
Gilbert Froment	Texas A & M University, USA
Jiří Hanika	Institute of Chemical Process Fundamentals, Prague, Czech Republic
Erik Heeres	Rijks Universiteit Groningen, The Netherlands
Valerii A. Kirillov	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Nikolay N. Kulov	Kurnakov Institute of General and Inorganic Chemistry RAS, Moscow, Russia
Guy Marin	Ghent University, Belgium
Wolter Prins	Ghent University, Belgium
Valerii Schvets	Mendeleev University of Chemical Technology of Russia, Moscow, Russia
Constantinos G. Vayenas	University of Patras, Greece
Andrey Zagoruiko	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia

LOCAL SCIENTIFIC COMMITTEE

Andrey N. Zagoruiko, **Chairman**	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Victor A. Chumachenko	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Sergei I. Reshetnikov	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Eugene I. Smirnov	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Vadim A. Yakovlev	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia

ORGANIZING COMMITTEE

Alexander S. Noskov, **Chairman**	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Nikolay N. Kulov	Kurnakov Institute of General and Inorganic Chemistry RAS, The Scientific Council on Theoretical Foundations of Chemical Technology RAS, Moscow, Russia
Aigana P. Kagyrmanova	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Natalya S. Krylova	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Oleg Yu. Ksenofontov	Russian Scientific and Cultural Center, Vienna, Austria
Irina V. Pivovarova	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Larisa G. Shubina	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Aleksey A. Spiridonov	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Tatiana V. Zamulina, **Secretary**	Boreskov Institute of Catalysis SB RAS, Novosibirsk, Russia
Conference co-organizer, executive representative of the Organizing Committee: **ILIKO TRAVEL company**	

The conference is held under the auspices of the Russian Federation Ministry of Industry and Trade

SILVER SPONSOR

The organizers express their gratitude to

Ministry of Education and Science of the Russian Federation, Moscow, Russia

for the financial support

PP-III-5

Al, Fe-PILLARED CLAYS IN CATALYTIC DECOLORIZATION OF DYE CONTAINING WATER

Banković P.[1], Milutinović-Nikolić A.[1], Mojović Z.[1], Jović-Jovičić N.[1], Žunić M.[1], Dondur V.[2], Jovanović D.[1]

[1]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Department of Catalysis and Chemical Engineering, Njegoševa 12, 11000 Belgrade, Republic of Serbia, E-mail: predragb@nanosys.ihtm.bg.ac.rs
[2]Faculty of Physical Chemistry, University of Belgrade

Al,Fe-pillared clays (PILCs) have shown good performance in catalytic wet peroxide oxidation (CWPO) of organic pollutants in water. They have predominantly been tested in the degradation of phenol [1]. There are seldom reports on their use in the degradation of other organic pollutants such as toluene [2] and dyes [3]. In this work a series of Al,Fe–PILCs with different Fe^{3+} content was synthesized and characterized. Their catalytic performance was studied in the CWPO of food dye tartrazine used as a model compound. Degree of decolorization of tartrazine containing aqueous solution was monitored in relation to different parameters such as Fe^{3+} content and temperature.

The PILCs were obtained using a common procedure [4] consisting of the following steps: grinding, sieving, Na exchange, intercalation, drying and calcination. Fe^{3+} to (Al^{3+}+Fe^{3+}) molar ratios in the pillaring solutions were 0%, 1%, 5%, 10%, 15% and 20%, and the corresponding materials were denominated Al–PILC, Al,Fe1–PILC, Al,Fe5–PILC, Al,Fe10–PILC, Al,Fe15–PILC and Al,Fe20–PILC, respectively. Phase composition, textural and morphological properties of the starting clay and the synthesized PILCs were determined using X-ray diffraction (Philips PW 1710 X-ray powder diffractometer with a Cu anode), physisorption of nitrogen (Sorptomatic 1990 Thermo Finningen), UV-Vis diffuse reflectance spectrometry (Thermo Evolution 500) and scanning electron microscopy (JSM-646 OLV JEOL). Chemical composition of the PILCs was determined using Spectro Spectroflame M - inductively coupled plasma optical emission spectrometer, together with atomic absorption spectrometer. X-ray diffraction analysis confirmed that the pillaring was successful. Chemical analysis confirmed the incorporation of Al^{3+} and Fe^{3+} species in the PILCs.

Catalytic tests were carried out in a semibatch reactor under stirring and constant temperature maintained by circulation of thermostatic fluid using Julabo MC 4 heating circulator. Initial dye concentration was 50 ppm in the presence of excess of H_2O_2.

Catalytic performance of the catalysts was examined using UV-Vis spectrophotometry. Figures 1 and 2 represent degradation of dye during the course of the reaction. The former shows the influence of Fe^{3+} content at temperature as low as 35°C, and the latter the influence of reaction temperature.

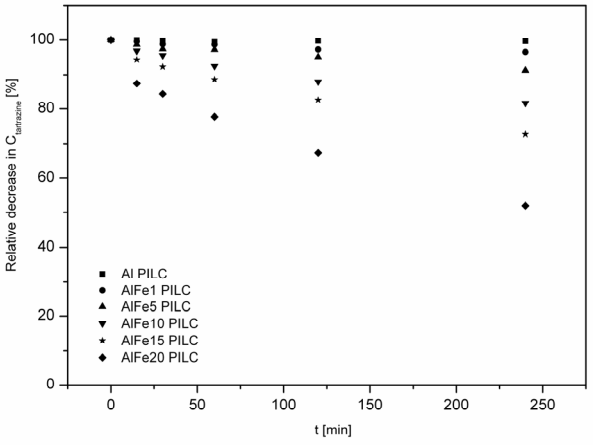

Fig. 1. CWPO of tartrazine on the series of Al,Fe–PILCs at 35°C

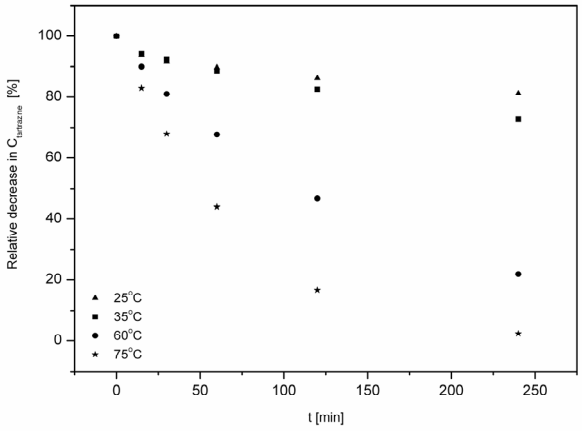

Fig. 2. CWPO of tartrazine on Al,Fe15–PILC at different temperatures

The catalytic tests showed good performance of the obtained Al,Fe–PILCs in the degradation of tartrazine, dependant on the Fe^{3+} content and temperature. For Al,Fe15–PILC it reaches about 98% after 4 h of the reaction conducted at 75 °C.

Here investigated method was proven to be efficient in the decolorization of tartrazine containing water, thus reducing sunlight cut-off effects, and have prospects as a first step in a two stage water purification method, where the second one could be biodegradation.

References

[1]. Appl. Clay Sci. **2003** Vol. 22, 303-308.
[2]. Chin. J. Cat. **2009** Vol. 30, 14-18.
[3]. Appl. Catal., B **2009** Vol. 88, 127-134.
[4]. Microporous Mater. **1995** Vol. 5, 97-106.

Acknowledgements

Supported by the Ministry of Science and Technological Development of the Republic of Serbia (Projects 166001 and 142019B).