

PhD Candidate Profile

Name:

Eva Pližingrová

Research Group (if relevant):

Photocatalysis group (<https://www.josefkrýsagroup.com/>)

Research Centre (if relevant):

N/A

Department/School(s) (if relevant):

Department of Inorganic technology

College:

University of Chemistry and Technology, Prague, Czech Republic

Supervisor(s):

prof. Josef Krýsa, PhD.

Ing. Jan Šubrt, CSc. (Supervisor specialist)

Funding body:

N/A

Area (field) of study:

Preparation of 2D-TiO₂ materials and study of their photoinduced processes in the liquid phase

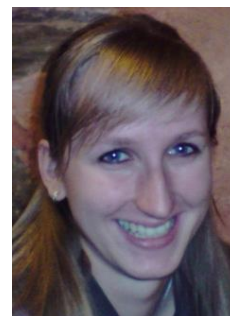
Thesis Title:

Preparation and characterization of photocatalysts based on TiO₂ and their application for water cleaning

Abstract:

Titanium dioxide is the most frequently used photocatalyst in the last decade. There are several different methods for the preparation of such photocatalyst. Next to the classic sulphate and chloride process the sol-gel method is used, especially on a laboratory scale. Our group deals with the preparation of 2D-TiO₂ nanosheets from an aqueous solution of titanylsulphate. These nanosheets have a high specific surface area thus higher number of active places, and as a result higher photoactivity is expected. The advantage of the preparation of 2D-TiO₂ nanosheets in comparison with the sol-gel method is that it does not require organic compounds for the synthesis of titanium dioxide. In addition, the preparation is simple and uses cheap raw materials.

Major limitations of TiO₂ in the context of its large-scale technological environmental application as photocatalyst come from its wide energy band gap, i.e. mainly UV light is necessary for the photoexcitation. Development of titania-based material which absorbs a



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substantial fraction of solar light represents the object of numerous studies, employing various approaches such as metal, non-metal doping, modification or surface impregnation and photodeposition methods. Therefore, our attention has been focused on the preparation, characterization and photinduced properties of doped 2D-TiO₂ nanosheets with both, metals and non-metals.

Collaborations:

Institute of Inorganic Chemistry of the CAS, v.v.i., Rez, Czech Republic

Publications:

J. Šubrt, P. Pulišová, J. Boháček, P. Bezdička, E. Pližingrová, L. Volfová, J. Kupčík: Highly photoactive 2D titanium dioxide nanostructures prepared from lyophilized aqueous colloids of peroxo-polytitanic acid, *Materials Research Bulletin*, 49 (2014) 405-412.

E. Pližingrová, L. Volfová, P. Svora, N. K. Labhsetwar, M. Klementová, L. Szatmáry, J. Šubrt, Highly photoactive anatase foams prepared from lyophilized aqueous colloids of peroxo-polytitanic acid, *Catalysis Today*, 240 (2015) 107-113.

E. Pližingrová, M. Klementová, P. Bezdička, J. Boháček, Z. Barbieriková, D. Dvoranová, M. Mazúr, J. Krýsa, J. Šubrt, V. Brezová, 2D-Titanium dioxide nanosheets modified with Nd, Ag, Au: Preparation, characterization and photocatalytic activity, *Catalysis Today*, 281 (2017) 165-180.

J. Šubrt, E. Pližingrová, M. Palkovská, J. Boháček, M. Klementová, J. Kupčík, P. Bezdička, H. Sovová, Titania aerogels with tailored nano and microstructure: comparison of lyophilization and supercritical drying, *Pure Appl. Chem.* 89 (2017) 501-509.

Z. Barbieriková, E. Pližingrová, M. Motlochová, P. Bezdička, J. Boháček, D. Dvoranová, M. Mazúr, J. Kupčík, J. Jirkovský, J. Šubrt, J. Krýsa, V. Brezová, N-doped titanium dioxide nanosheets: Preparation, characterization and UV/visible-light activity, *Applied catalysis B: Environmental*, 232 (2018) 397-408.

Presentations:

5th Czech-Austrian workshop: New trends in photo and electro catalysis, Hnanice, Czech Republic, 28-30 November 2012.

SP4-Forth International Conference on Semiconductor Photochemistry, Prague, Czech Republic, 23-27 June 2013.

JEP 2013 - Third European Symposium on Photocatalysis, Portoroz, Slovenia, 25-27 September 2013.

6th Czech-Austrian workshop: New trends in photo- and electro-catalysis, Hnanice, Czech Republic, 2-4 December 2013.

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12th Pannonian Symposium on Catalysis, Třešť, Czech Republic, 16-20 September 2014.

7th Czech-Austrian workshop: New trends in photo- and electro-catalysis, Hnanice, Czech Republic, 25-27 May 2015.

SP5 - 5th International Conference on Semiconductor Photochemistry, Petrohrad, Russia, 27-31 July 2015.

SPEA 9 - 9th European meeting on solar chemistry and photocatalysis: Environmental applications, Strasbourg, France, 13-17 June 2016.

8th Czech-Austrian workshop: New trends in photo and electro catalysis, Hnanice, Czech Republic, 30 November -2 December 2016.

EAAOP 2017 - Environmental Applications of Advanced Oxidation Processes, Prague, Czech Republic, 25-29 June 2017.

SPEA 10 - 10th European meeting on solar chemistry and photocatalysis: Environmental applications, Almería, Spain, 4-8 June 2018.