# Prospective supervisor's form

**Name of the supervisor:** Anna Zielińska-Jurek

**Academic title:** PhD. DSc. Eng.

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**Faculty of** Chemistry

**Gdańsk University of Technology** **Department of** Process Engineering and Chemical Technology

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**Discipline**[i] chemical sciences [NCh] materials engineering [IMa]

**Optional**

**Key words (obligatory four key words describing research interests / expertise):**

**#** photocatalysis

**#** nanocomposites

**#** magnetic photocatalysts

**#** nanostructures

**Bibliometric indicators**

1. Number of journal publications in WoS/ Scopus 28/30
2. Citations excluding self-citations WoS 860 Scopus 860
3. Hirsch index WoS 13 Scopus 14

1. The number of PhD students who have graduated under your supervision: 2
2. The number of PhD students currently supervised:
   a. within the current doctoral school 0
   b. within doctoral studies (previous system) 5
3. Are you currently accepting new PhD students:
   a. Polish *Yes/No* Yes
   b. Foreign *Yes/No* Yes

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**Research interests or topics offered for PhD research (no more than 2000 characters)[ii]**

Heterogeneous photocatalysis is highly appreciated for removal of organic contaminants of emerging concern from gas and aqueous phase, since under specific conditions reactive oxygen species are generated in-situ. The capacity of chemical treatment processes targeting non-biodegradable compounds to increase their biodegradability by for instance a strong oxidant attack is the most efficient combination. Therefore, photocatalysis is an alternative or synergetic process for biological degradation. At present, the need to develop ecologically clean solar-induced chemical processes, such as photocatalysis, are limited by low quantum efficiencies. Among various efforts to extend photocatalytic activity special attention is focused on the design of morphology and microstructure of semiconductor material during preparation procedure in order to achieve enhanced photodegradation of persistent organic pollutants.
In this regard, to enhance the performance of semiconductor, a suitable architecture, which integrates the usually incompatible features of large specific surface area, high charge-carrier mobility, low electron-hole recombination rate, is highly demanded.
The work in the research team of photocatalysis focuses on recent progress and developments in design, synthesis and properties of highly functional nanostructured photocatalysts. Furthermore, research into understanding the mechanism of photocatalytic degradation of persistent organic pollutants, processing–structure–property relationship will be important subjects of the PhD studies.

Potential topics include, but are not limited to:
1. Photocatalysts with different morphologies like nanocrystals, nanopores, and hierarchical structure
2. Doped or composite nanomaterials for photocatalysis
3. Self-doped semiconductors for photocatalysis
4. Various photocatalytic applications like water splitting, pollutant removal, CO2 reduction, and useful products synthesis
5. Both experimental and theoretical results

**Funding or special equipment needed to carry out a PhD project[iii]:**

1. Is funding available for experimental work: *Yes/No/not needed* — Yes
2. Is the equipment needed to complete a PhD project available in your lab/department: *Yes/No/not needed* — Yes

**Most important publications – no more than 5 published after 1.01.2018**

| No | Authors/title/journal | Number of points according to the current list of the Ministry of Science and Higher Education | Publication year |
|---|---|---|---|
| 1. | E. Mrotek, S. Dudziak, I. Malinowska, D. Pelczarski, Z. Ryżyńska, A. Zielińska-Jurek, Improved degradation of etodolac in the presence of core-shell ZnFe2O4/SiO2/TiO2 magnetic photocatalyst, Science of the Total Environment 724 (2020) 138167 | 200 | 2020 |
| 2. | A. Sulowska, I. Wysocka, D. Pelczarski, J. Karczewski, A. Zielińska-Jurek, Hybrid TiO2–polyaniline photocatalysts and their application in building gypsum plasters, Materials (2020), 13, 1516, doi:10.3390/ma13071516 | 140 | 2020 |

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| 3. | I. Wysocka, A. Markowska-Szczupak, P. Szweda, J. Ryl, M. Endo-Kimura, E. Kowalska, G. Nowaczyk, A. Zielińska-Jurek, Gas-phase removal of indoor volatile organic compounds and airborne microorganisms over mono- and bimetal-modified (Pt, Cu, Ag) titanium(IV) oxide nanocomposites, Indoor Air, 29 (2019) 979-992 | 140 | 2019 |
| 4. | I. Wysocka, E. Kowalska, J. Ryl, G. Nowaczyk, A. Zielińska-Jurek, Morphology, photocatalytic and antimicrobial properties of TiO2 modified with mono- and bimetallic copper, platinum and silver nanoparticles, Nanomaterials, 9 (2019), doi:10.3390/nano9081129 | 70 | 2019 |
| 5. | A. Zielińska-Jurek, Z. Wei, M. Janczarek, I. Wysocka, E. Kowalska, Size-controlled synthesis of Pt particles on TiO2 surface: Physicochemical characteristic and photocatalytic activity, Catalysts, 9 (11) 940 (2019), doi: 10.3390/catal9110940 | 100 | 2019 |

**Most recent externally funded projects you were involved in – no more than 3**

| No | Project title, the name of the Principal Investigator (PI) and the institution the project was carried out | Years | Role in the project [iv] |
|---|---|---|---|
| 1. | Design, synthesis, and physicochemical characterization of 2D nanosheet-based hybrid photocatalysts for degradation of pharmaceuticals, Anna Zielińska-Jurek - Principal Investigator, National Science Center | 2019-2022 | PI |
| 2. | Studies on preparation, physicochemical characterization of TiO2 nanocomposites based on spinel and hexagonal ferrites for oxidation of organic compounds in the aqueous phase, Anna Zielińska-Jurek - Principal Investigator, National Science Center | 2017-2019 | PI |
| 3. | New photocatalysts for environmentally friendly recycling of water in the production of hydrocarbons, Anna Zielińska-Jurek - Principal Investigator, Polish-Norwegian Research Programme (Small Grant Scheme) operated by the National Centre for Research and Development | 2013-2017 | PI |

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**Additional relevant information (no more than 1600 characters)[v]**

[i] You may select up to two disciplines out of 12 disciplines represented in the Doctoral School

[ii] Observe the limit of not more than 2000 characters

[iii] Leave only one answer

[iv] Select the role in the project: PI stands for principal investigator (refers to the holder of an independent grant and the lead researcher for the grant project), Co-I for co-investigator (Co-I assists the principal investigator in the management and leadership of the research project), R for researcher

[v] Add any other relevant information e.g. awards for PhD students whom you supervised (no more than 1600 characters)