

# Prospective supervisor's form

Name of the supervisor

Academic title:

Orcid ID number: [https://orcid.org/0000-](https://orcid.org/0000-0003-1459-4199)

Faculty of

Gdańsk University of Technology Department of

Phone: +48

E-mail:

Personal web page: [https://pg.edu.pl/](https://pg.edu.pl/f4f4a06c58_janusz.smulko)

Discipline<sup>1</sup>

Optional

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

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## Bibliometric indicators

1. Number of journal publications in WoS/ Scopus

2. Citations excluding self-citations WoS  Scopus

3. Hirsch index WoS  Scopus

1. The number of PhD students who have graduated under your supervision:

2. The number of PhD students currently supervised:

a. within the current doctoral school

b. within doctoral studies (previous s

3. Are you currently accepting new PhD students:

a. Polish Yes/No

b. Foreign Yes/No

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### Research interests or topics offered for PhD research (no more than 2000 characters)<sup>ii</sup>

Application of two-dimensional materials (e.g., graphene oxide, MoS<sub>2</sub>, TaS<sub>2</sub>) for gas sensing. Some of these materials exhibit photocatalytic effect and can be modulated by UV-light. PhD students will be involved into the selected points: i) sensors characterization, ii) measurements of gas response, iii) signal processing for detection of gas-mixture components. These materials are hot topics in science and we can expect interesting results published in prestigious journals.

Detection of defects in coverage of the printed electronic boards (PCB) by UV-light inspection. The PCB is covered by conformal coating (polymer film 25-75 µm thick) protecting electronic circuits from harsh environments (e.g., moisture, dust, chemicals). Conformal coating requires final inspection to detect any inconsistencies, delamination, etc. PhD student will be involved in video signal recording, processing and analysis to determine different types of failures and to reduce the rate of false alarms. The thesis will be worked out with Flextronics International Poland company, delivering information about possible defects.

Evaluation of selected blood components by non-invasive method utilizing Raman spectroscopy. The patented method applies hearth pulse to expose the component of Raman spectrum related to blood cells, and independent from individual characteristic of skin tissue irradiated by laser. This idea emerged a few years ago and will be run with the team from Johns Hopkins University, USA. The thesis will focus on signal processing reducing background noise and interferences, and selecting the most informative sub-bands of spectra.

### Funding or special equipment needed to carry out a PhD project <sup>iii</sup>:

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.	Smulko J., Advanced operating methods (Chapter 10, pp. 189-208). In: Advanced Nanomaterials for Inexpensive Gas Microsensors: Synthesis, Integration and Applications. Valero, E. L. (Ed.). (2019). Elsevier. MojaPG: 150734	80	2020
2.	Shan, X., Tang, L., Wen, H., Martinek, R., Smulko, J. (2020). Analysis of vibration and acoustic signals for non-contact measurement of engine rotation speed. Sensors, 20(3), 683. MojaPG: 151194	100	2020

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3.	Lentka, Ł., Smulko, J. (2019). Methods of trend removal in electrochemical noise data–Overview. Measurement, 131, 569-581. MojaPG: 146104	200	2019
4.	Galla, S., Szewczyk, A., Smulko, J., Przygocki, P. (2019). Methods of Assessing Degradation of Supercapacitors by Using Various Measurement Techniques. Applied Sciences, 9(11), 2311. MojaPG: 148902	70	2019
5.	Saidi, T., Palmowski, D., Babicz-Kiewlicz, S., Welearegay, T. G., El Bari, N., Ionescu, R., Smulko, J., Bouchikhi, B. (2018). Exhaled breath gas sensing using pristine and functionalized WO3 nanowire sensors enhanced by UV-light irradiation. Sensors and Actuators B: Chemical, 273, 1719-1729. MojaPG: 145819	140	2018

**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 <sup>iv</sup>
1.	H2020-MSCA-RISE-2014 “Development of a non-invasive breath test for early diagnosis of tropical diseases”, TROPSENSE, Horizon 2020, Gdańsk University of Technology.	2015-2019	PI
2.	OSF 274237 National Science Center, Poland “Charging/discharging mechanism at the electrode/electrolyte interface of supercapacitors”, Gdańsk University of Technology.	2015-2019	PI
3.	HARMONIA 3 2012/06/M/ST7/00444 National Science Center, Poland “Detection of gases by means of nanotechnological resistance sensors”, Gdańsk University of Technology.	2013-2015	PI

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### Additional relevant information – (no more than 1600 characters)<sup>v</sup>

All my PhD students defended their thesis summa cum laude.

I have submitted a few grant proposals in the last year and expect additional funds for PhD students to run research focused on gas sensing and signal processing, and support financially PhD students. I am going to use 2D materials of extremely high ratio of active sensing area to its volume and excellent gas sensing sensitivity.

Maciej Wróbel (PhD 2019) has got a scholarship of the Polish Ministry of Science and Higher Education. He got a scholarship at Johns Hopkins University, USA. He runs Preludium project about SERS in Raman spectroscopy.

Łukasz Lentka (PhD 2019) has published the paper "Highly Cited in Field" (Measurement, 131, pp. 569-581, 2019).

Maciej Trawka (PhD 2017) has co-authored a series of papers proposing UV-light irradiation for enhanced gas sensing.

Sylwia Babicz-Kiewlicz (PhD 2016) has designed a set-up to observe higher harmonics in atomic force microscopy.

Andrzej Kwiatkowski (PhD 2014) has got an award of the Gdańsk Science Society and Mayor of Gdańsk in 2014. He proposed a new specialization for students: Embedded Systems.

Mateusz Kotarski (PhD 2012) runs data mining company:

<https://praca.trojmiasto.pl/Ciekawe-zawody-Zaklinacz-danych-n135674.html>

<sup>i</sup> You may select up to two disciplines out of 12 disciplines represented in the Doctoral School

<sup>ii</sup> Observe the limit of not more than 2000 characters

<sup>iii</sup> Leave only one answer

<sup>iv</sup> 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

<sup>v</sup> Add any other relevant information e.g. awards for PhD students whom you supervised (no more than 1600 characters)