

Prospective supervisor's form

Name of the supervisor: Adam Macierzanka

Academic title: Associate Professor

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Gdańsk University of Technology Faculty of Chemistry

Department of Colloid and Lipid Science

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Discipline: chemical sciences [NCh] none

Optional

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

colloid science

food science and technology

digestion and absorption

physical chemistry

Bibliometric indicators

1. Number of journal publications in WoS/ Scopus 31/33

2. Citations excluding self-citations WoS 2136 Scopus 2374

3. Hirsch index WoS 18 Scopus 18

1. The number of PhD students who have graduated under your supervision: 0

2. The number of PhD students currently supervised:

a. within the current doctoral school 0

b. within doctoral studies (previous system) 1

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

The main research interests and activities span a wide range of topics in colloid, lipid and interface sciences, where determining the fundamental interactions of various colloidal structures with the human body can lead to the development of new functional foods or delivery systems for bio-active substances.

The main areas of research are as follows: (i) investigation of physicochemical interactions of proteins, lipids and carbohydrate biomolecules, (ii) characterisation of the role of various biomolecules and their colloidal interactions during gastrointestinal digestion and absorption processes, and (iii) design and formation of dispersed systems such as nanoemulsions, microemulsions and gels for food/dietary, pharmaceutical and cosmetic applications.

In this respect, one of the major research activities currently being undertaken (and offered to PhD candidates) focuses on investigating the physicochemical aspects of the breakdown of colloidal food structures and delivery systems under physiological conditions of the human gastrointestinal tract. The main objectives have been to gather fundamental knowledge on colloidal mechanisms involved in the functioning of the digestive system in the context of a neonatal, adult and aging gut, and to produce a rationale for the design of personalised nutrition.

The research will focus on determining what fundamental microstructural characteristics food structures should possess that would make them applicable in nutritional interventions targeting various physiological responses, such as preventing excessive calorie intake from ingested lipids in adult humans, preventing food allergies in infants, or preventing skeletal muscle loss in the elderly. Experiments will involve using in vitro models of human digestion (a biochemical and physicochemical approach), interfacial physicochemical techniques, microscopy (including quantitative confocal microscopy methods), electrophoresis, conventional analytical chemistry, etc.

Funding or special equipment needed to carry out a PhD projectⁱⁱⁱ:

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.	Macierzanka A., Torcello-Gómez A., Jungnickel C., Maldonado-Valderrama J. / Bile salts in digestion and transport of lipids. / <i>Advances in Colloid and Interface Science</i> , 274, 102045	200	2019
2.	Macierzanka A., Mackie A.R., Krupa L., / Permeability of the small intestinal mucus for physiologically relevant studies: Impact of mucus location and ex vivo treatment. / <i>Scientific Reports</i> , 9, 17516	140	2019

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3.	Brodkorb A., ... Corredig M., Dupont D., Dufour C., Edwards C., Golding M., Karakaya S., Kirkhus B., Le Feunteun S., Lesmes U., Macierzanka A., et al. / INFOGEST static in vitro simulation of gastrointestinal food digestion. / Nature Protocols, 14, 991-1014	200	2019
4.	Böttger F., Dupont D., Marcinkowska D., Bajka B., Mackie A., Macierzanka A. / Which casein in sodium caseinate is most resistant to in vitro digestion? Effect of emulsification and enzymatic structuring. / Food Hydrocolloids, 88, 114-118.	140	2019
5.	Bohn, T., ... Macierzanka, A., Menard, O., ... Recio, I., Rémond, D., Santé-Lhoutelier, V., Wooster, T.J., Lesmes, U., Mackie, A.R., Dupont, D. / Correlation between in vitro and in vivo data on food digestion. What can we predict with static in vitro digestion models? / Critical Reviews in Food Science and Nutrition, 58, 2239-2261	200	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 ^{iv}
1.	'Impact of food digesta microstructure on colloidal transport of nutrients through the small intestinal mucosal barrier' (NAWA grant, Bekker Programme), PI: Adam Macierzanka, Riddet Institute, Massey University (Palmerston North, New Zealand)	2019-2020	PI
2.	'FOODINTEGRITY - Consumer and Brand Protection in Complex Foods from Protein Signatures Using Mass Spectrometry' (European Commission FP7 grant), PI: Adam Macierzanka, Gdansk University of Technology (Gdansk, Poland)	2016-2018	PI
3.	'Quantification of the physicochemical mechanisms that determine the bioaccessibility of dietary proteins during digestion' (Biotechnology and Biological Sciences Research Council grant, BBSRC UK), PI: Adam Macierzanka, Institute of Food Research (Norwich, United Kingdom)	2014-2015	PI

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Additional relevant information – (no more than 1600 characters)^v

This PhD position would suit a talented person with a passion for science and the drive and enthusiasm needed to learn new skills.

After initial training, the PhD candidate will (co-)design and conduct experiments, prepare and present their work at meetings, and draft sections for scientific manuscripts.

The candidate will be expected to visit other laboratories abroad and work on collaborative projects, and therefore a good knowledge of English is required.

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)