

Krakow, February 1, 2019

Comments

to the Habilitation Thesis of Dr. Pavlina Basarova entitled:
"Bubble-particle interactions during the flotation of plastics"

1. Introductory and general remarks

My review (opinion and comments to) of the Habilitation Thesis entitled: "Bubble-particle interactions during the flotation of plastics", presented by of Dr. Pavlina Basarova, the member of the Department of Chemical Engineering of the University of Chemistry and Technology in Prague, has been prepared on request of prof. dr. hab. Pavel Hasal the Chairman of the Evaluation Committee elected for this habilitation procedure, and I am pleased to express my support for promotion Dr. Basarova to the rank of associate professor.

In recent ca. 15-20 years I have met Dr. Pavlina Basarova many times on various international conferences, where she presented results of her studies. Her presentations were always well prepared, clearly delivered and interesting not only for me but also many others in the audience. In years 2012-2016 we both, together with research teams from various scientific institutions of 31 European countries, have participated in activities of the COST Action MP1106 "Smart and green interfaces - from single bubbles and drops to industrial, environmental and biomedical applications (SGI)" project. During the conferences and especially the COST meetings I have had a lot of interesting discussions with Dr. Basarova on various scientific topics, which clearly showed me her broad knowledge and scientific maturity.

Topic of Dr. Basarova Habilitation Thesis is related to very actual problem of our civilization, that is, plastics wastes becoming a real danger for environment and a food chains. According to UN report (*UNEP (2018) SINGLE-USE PLASTICS*: the world production of plastics exceeds 400 million tons per year and more than 8.3 billion tons of plastic has been produced since 1950s. It is estimated that ca. 60% of that plastic, mainly single-use plastics, has ended up in either in waste dumps and municipal landfills or in natural environment, and

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the attached bubble on kinetics of the TPC spreading in pure water and surfactant solutions. wetting films, the three phase contact (TPC) spreading and influence of shape pulsations of bubbles around larger particles, bubbles collisions and shape pulsations during rupture of the using high speed camera (from 500 up to 16 000 frames per second), trajectories of small liquid-solid) perimeter. Unique, home-developed experimental set-ups were used to monitor, rupture of thin wetting films and kinetics of spreading and formation of the three phase (gas- and mechanism of processes occurring during the bubble collisions with plastic surfaces, It is really a good Thesis containing novel and valuable data, especially on dynamics

ideas and to organize a scientific collaboration for solving problems of common interest. standing in international scientific community, ability to convince others to her scientific author and the paper's concepts were mainly her. Moreover, it is an indication of her good corresponding author in 11 of these 12 papers, so it clearly proves that she was a leading institutions, not only from Czech Republic but also from abroad, and Dr. Basarova is the circulation. As many of the papers has been co-authored by scientists from various scientific All papers contained in the Thesis were published in good journals of world-wide of various plastic materials, etc.

attachment processes to solid surfaces, as well as, on motion of rising bubbles and wettability influence of concentration of different surfactants on bubbles collisions and kinetics of fundamentals of the bubbles and particles interactions during their collision and attachment, date literature data on basic principles of minerals and plastics flotation and separation, obtained in these publications are shortly, but clearly described, and confronted with up-to- and rationally planned studies are presented. In the summary the most important results preceded by a concise (32 pages with 81 references) summary, where results of systematic Habilitation Thesis of Dr. Pavlina Basarova it is a coherent set of 12 publications

2. Analysis of the Habilitation Thesis

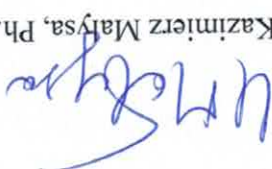
formation, are – in my opinion – of high importance and very actual. elementary act of flotation, that is, mechanism and kinetics of the bubble-plastic aggregates which are focused on deepening knowledge and better description fundamentals of the plastic mixtures. Therefore, the studies presented by Dr. Basarova in her Habilitation Thesis, the plastics separation. Froth flotation seems to be very promising technique for separation of necessity of our times and so are the studies aimed at improvement efficiency of methods of only 9% of all plastic waste ever produced has been recycled. Thus, plastics recycling is a

In series of well-planned experiments and thanks to application of high speed camera Dr. Basarova obtained a lot of novel and very interesting data. I found especially fascinating the data showing how rapid are phenomena occurring during the wetting films rupture and the TPC spreading over hydrophobic solid surfaces in pure water and surfactant solutions. It is showed that in pure water the TPC maximum expansion velocity was close up to 1000 mm/sec, but lasted only a few milliseconds. Moreover, thanks to a careful analysis sequences of the frames, recorded with time intervals of 0.0625 milliseconds only, there were spotted on the velocity vs. time dependences some characteristic peaks at times ca. 1-2 ms after the film rupture in pure water and related to sizes of the colliding bubbles. It was showed and explained convincingly and properly - in my opinion - that these peaks had hydrodynamic origin and were associated with an increase of total kinetic energy of the system, resulting from violent shape pulsations of the attached bubbles. In surfactant presence the velocity of the TPC expansion was significantly slower and lasted much longer (ca. 20ms), because the surfactant adsorption at liquid/gas interface caused the interface immobilization and dampening the bubble shape pulsation, as a result of induction of surface tension gradients there (Marangoni effect).

3. Concluding remarks

I highly appreciate Dr. Pavlina Basarova habilitation thesis. It is a solid piece of scientific work, containing many novel and valuable data. The Thesis papers were published in journals of world-wide circulation and Dr. Basarova was the corresponding author, what shows that she was the leading author and her was the idea of these papers. She is mature and self-dependent scientist, has developed an international collaboration and is well-known in international community of her scientific specialty.

The Thesis submitted by Dr. Pavlina Basarova fulfils all requirements stated by Act No. 111/1998 Coll. (Amended and consolidated) on Higher Education Institutions (The Higher Education Act) and to internal regulations of the University of Chemistry and Technology, Prague. Summarizing, I am fully convinced and strongly support promotion of Dr. Pavlina Basarova to the rank of Associate Professor.


prof. Kazimierz Matyja, Ph.D., D.Sc.

Unknown, Feb. 1, 2019