*The **CREA**tion of the Department of Physical Chemistry of Biological Sys**TE**ms [CREATE]*

666295 — CREATE — H2020-WIDESPREAD-2014-2015/H2020-WIDESPREAD-2014-2

Report on the visit of prof. Carlos Drummond

[WP3]

Level of dissemination: PUBLIC

Warsaw, October 2017

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INTRODUCTION

The visit of Prof. Carlos Drummond at the Institute of Physical Chemistry of the Polish Academy of Sciences (IPC) was held under a series of cyclical lectures on interdisciplinary emerging research.

For this reason Prof. Carlos Drummond was invited to IPC to:

- deliver seminar lectures on his studies;
- participate in meetings with synergetic teams to support mentoring activity of the ERA Chair holder;
- take part in the consultations on possible changes in IPC and give their recommendations for the Institute.

Carlos Drummond received his Ph.D. from the University of California, Santa Barbara (1999), and has been a CNRS-University of Bordeaux research fellow since 2003.
His research interests include Surface Forces, Nanotribology, and Responsive Functional Surfaces.

THE COURSE OF THE VISIT

The visit of Carlos Drummond took place on the 10th – 13th, October, 2017 [see annex 1 for agenda].

On the first day of the visit, Carlos Drummond delivered a seminar entitled *"From fire ants to graphene: some considerations on water-hydrophobic interfaces"*. The seminar was held in the assembly hall of IPC. All researchers and PhD students employed at IPC were invited to participate in this seminar.


The seminar of Carlos Drummond, assembly hall, the 10th October, 2017.

Abstract of the seminar

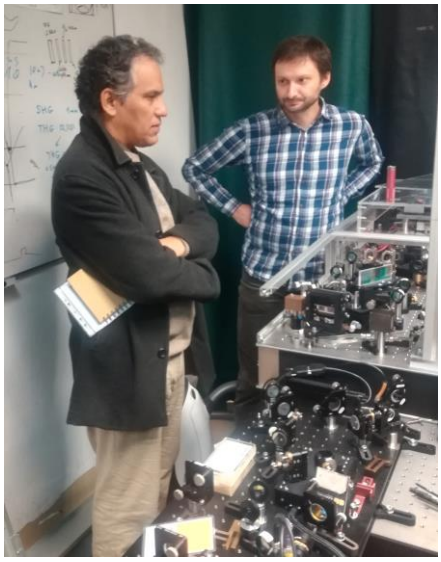
The interface between water and hydrophobic surfaces plays a central role in a number of important subjects like proteins folding, surfactant self-assembly, detergency or oil recovery. These interfaces show a complex behavior not always well-understood, often determined by (apparently) secondary actors like ionic species or gases dissolved in the aqueous phase. In this seminar I will describe few examples illustrating the complexity of these interfaces. More precisely, I will discuss the interaction between ions in water and hydrophobic polymers,[1] the behavior of single layer graphene or carbon nanotubes in water,[2] and ion-specific effects on the behavior of temperature-responsive Poly(N-isopropylacrylamide).[3] Finally, I will discuss some examples of how the complexity of water-hydrophobic interfaces can be of use to manipulate the properties of materials.

See annex 2 for full abstract of the seminar.

After the seminar and also during the second day of his visit Carlos Drummond visited selected laboratories. The aim of this visits was to familiarize with IPC PAS, establish contacts with synergic groups supporting the ERA Chair holder and discuss possibility of future cooperation. The purpose of these visits was also to assess the research conducted in individual groups and to identify possible problems.

Meetings with the following research groups were organized:

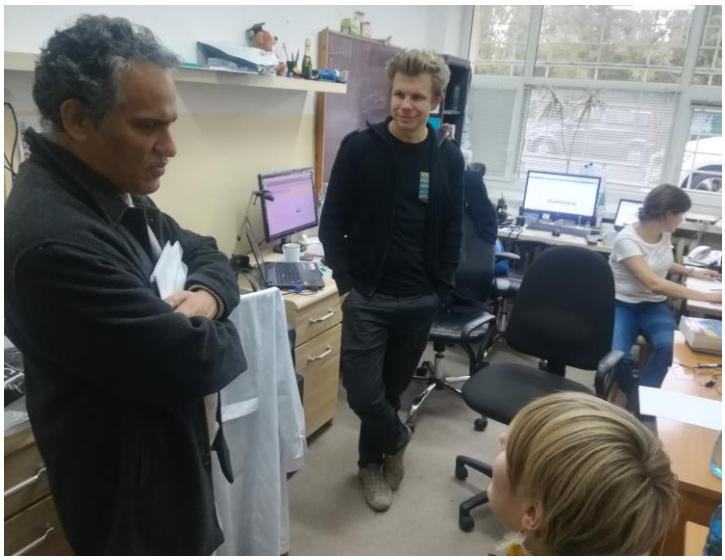
- **Dr. Gonzalo Angulo**, Associate Professor, and **Dr. Marcin Pastorczak** – members of the Department of photochemistry and spectroscopy, Laser Centre



- **Dr. Katarzyna Szot-Karpińska and Marta Janczuk-Richter** – members of the Surface Nanoengineering for chemo- and bio-sensors Group

- **Dr. Martin Jonsson-Niedziolka** – head of Charge transfer processes in hydrodynamic

systems Group, and **dr. Emilia Witkowska-Nery** – member of this group



- **Dr. hab. Volodymyr Sashuk** – head of the group of Chemistry in Confined Spaces

- **Prof. Janusz Lewiński**, Head of the Organometallic and Materials Chemistry Group.

- **Prof. Robert Hołyst** – head of the Soft Condensed Matter Group,

dr Krzysztof Sozański and Łukasz Richter – members of this group.

- **Marcin Izydorzak**, CEO at Scope Fluidics Inc and Curiosity Diagnostics Ltd – two spin-off companies located on the permises of IPC dealing with microfluidic devices for medicine and biotechnology (Scope Fluidics) and new technologies in digital assaying (Curiosity Diagnostics).

- **Dr. Piotr Garstecki** – head of the Microfluidics and Complex Fluids Group, and **dr Tomasz Kamiński** – the member of this group.

On the third day, prof. Carlos Drummond's visited the Department of Physical Chemistry of Biological Systems led by **prof. Maciej Wojtkowski**, ERA Chair Holder. The guest had the opportunity to learn from group members about the research projects carried out in the newly established department.

After visiting all selected laboratories, the summary of the visit and discussion on recommendations for the Institute took place in a group of:

- **Professor Carlos Drummond** – the visiting guest
- **Professor Maciej Wojtkowski** – the ERA Chair holder, head of Department of Physical Chemistry of Biological Systems, IPC PAS
- **Professor Robert Holyst** – Project Coordinator, head of Department of Soft Condensed Matter, IPC PAS.

Discussion between prof. Maciej Wojtkowski, prof. Carlos Drummond and prof. Robert Hołyst, (from left).

Professor Carlos Drummond, who visited the IPC PAS 5 years ago, was very much impressed by the changes made during this time and progress measured in terms of significant publications, patents, spin-off companies and particularly by the amount of internal collaboration within the Institute. Lack of barriers for internal collaboration was underlined by him as a key to future success of the Institute. He was also impressed by Institute's collaboration with business and industry and ease of that collaboration with no internal or external barriers.
However prof. Carlos Drummond pointed out that in some groups, PIs don't have a clear vision of the future of their research. Lack of clear goal hampers the development of science, therefore some measures have to be taken to change this situation. Prof. Maciej Wojtkowski declared that he would ask PIs to define their mission and describe briefly the scope of their activity. Following this, they will be also obliged to place theirs specific mission on their group's websites.
Prof. Carlos Drummond also pointed out that one clear barrier that he sees in the development of the Institute is low state budget. He said that 5 mln euro per year on all costs (including salaries) is 3 times too small for a decent scientific unit of the size of our Institute (~300 employees). Prof. Robert Holyst agreed, but he said that in a present situation in Poland the only way to have a higher budget is via the national and European grants.

It is also worth to add that prof. Drummond was impressed by liberal regulations (national and internal level) and promotion of early entrepreneurship activity of PIs and PhD students. He also pointed out that there is very propitious climate for creating new spin out and spin off companies in PAS.

Summarizing, all discussants agreed that the current position of the Institute is high and importantly it has a rising tendency. Low budget and lack of purpose for some research in the Institute is not a major factor that would impede development of the Institute in the coming years.

ANNEX 1.

Full agenda of the visit of Carlos Drummond

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CREATE lectures

The Institute of Physical Chemistry of the Polish Academy of Sciences

Agenda

10th October, 2017

10.00-11.30	**Carlos Drummond**
	„From fire ants to graphene: some considerations on water-hydrophobic interfaces"
12.00-12.30	**Lunch**
12.30-14.25	**lab visits**
12.30-13.00	dr Yuriy Stepanenko
	Department of photochemistry and spectroscopy - Laser Centre
13.00-13.30	dr hab. Joanna Niedziółka-Jonsson
	Surface Nanoengineering for chemo- and bio-sensors Group
13.30-14.00	dr Martin Jonsson-Niedziółka
	Charge transfer processes in hydrodynamic systems Group
14.00-14.30	dr Volodymyr Sashuk
	Chemistry in Confined Spaces
14.30-15.00	prof. Janusz Lewiński
	Organometallic and Materials Chemistry Group

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11th October, 2017

10.30-13.00	prof. Robert Hołyst
	Soft Condensed Matter Group
13.00-13.30	Marcin Izydorzak (CEO)
	Scope Fluidics Inc and Curiosity Diagnostics Ltd
13.30-14.00	Prof. Piotr Garstecki
	Microfluidics and Complex Fluids Group

12th October, 2017

10.00-11.00	**lab visit**
	Prof. Maciej Wojtkowski, ERA Chair Holder
	Department of Physical Chemistry of Biological Systems
11.00-13.00	**Summary of the prof. Carlos Durmmond visit**
	Discussion & recommendation
	Prof. Maciej Wojtkowski - ERA Chair Holder
	Prof. Robert Hołyst – CREATE Project Coordinator
13.00	**Lunch**

13th October, 2017

Departure to the airport

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ANNEX 2.

Full abstract of the seminar

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From fire ants to graphene: some considerations on water-hydrophobic interfaces

Carlos Drummond

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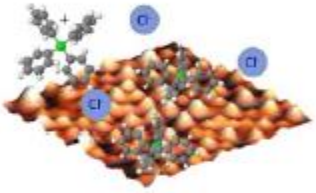
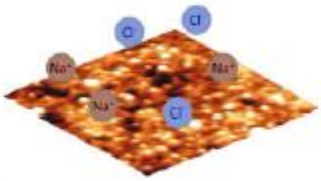
The interface between water and hydrophobic surfaces plays a central role in a number of important subjects like proteins folding, surfactant self-assembly, detergency or oil recovery. These interfaces show a complex behavior not always well-understood, often determined by (apparently) secondary actors like ionic species or gases dissolved in the aqueous phase. In this seminar I will describe few examples illustrating the complexity of these interfaces. More precisely, I will discuss the interaction between ions in water and hydrophobic polymers,[1] the behavior of single layer graphene or carbon nanotubes in water,[2] and ion-specific effects on the behavior of temperature-responsive Poly(N-isopropylacrylamide).[3] Finally, I will discuss some examples of how the complexity of water-hydrophobic interfaces can be of use to manipulate the properties of materials.





Ion Adsorption ⟶ Nanostructuration

Additives-free graphene dispersion

1. Siretanu, Chapel and Drummond, *ACSNano* 5, 2939, 2011
2. Bepete, Anglaret, Ortolani, Morandi, Pénicaud and Drummond. *Nature Chemistry*, 9, 347–352 2017
3. Bastos-Gonzalez, Pérez-Fuentes, Drummond and Faraudo. *Current Opinion in Colloid & Interface Science*, 23, 19–28, 2016

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