

# Towards novel technologies based on phoretic flow effects

Call: H2020-FETOPEN-2016-2017

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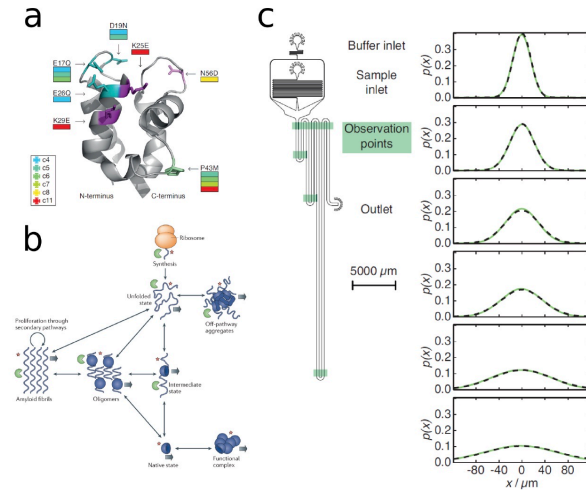


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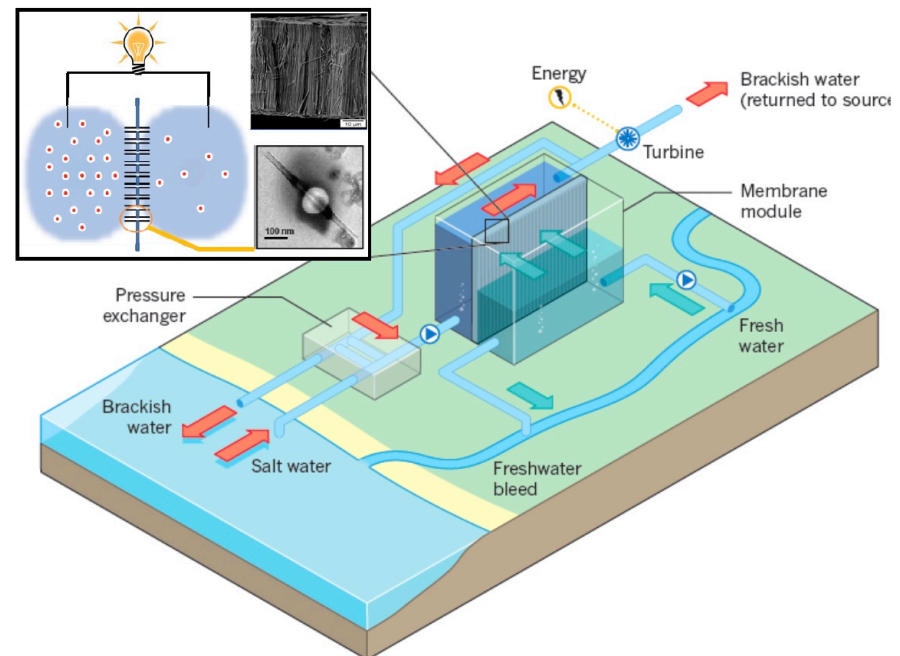
Clarify fundamentals thermodynamic transport down to nanoscale

Exploit gradient-driven surface flows

New biotechnological devices  
Increased sensitivity  
Versatility



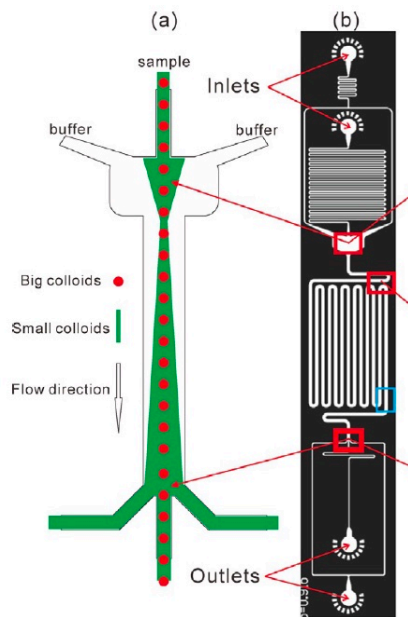
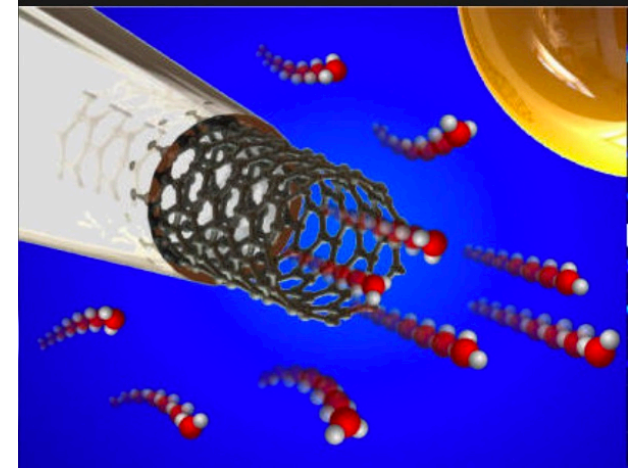
Identify new venues for  
energy harvesting  
membrane technology



Beyond state-of-the-art microfluidic technology

Challenges to scale down

Much less known at nanoscale



Combine  
Fundamental understanding emerging phenomena  
close collaboration with technological development



NANOPHLOW structure

WP1

WP2

Molecular origin thermodynamic forces  
 Solute and surface specificity  
 Fluctuation/correlation  
 dominated regimes

Upscaling

Non-linear phoretic transport  
 Salinity gradient power  
 through nano pores  
 Phoresis on binary mixtures

Nano membrane designs

Energy harvesting in nano pores  
 osmotic energy harvesting  
 nanoporous membranes  
 osmotic diode effect  
 osmotic diodes for desalination processes  
 Transfer of technology strategy

Microfluidic platform  
 ion binding on protein diffusiophoresis  
 diffusiophoresis for protein diagnostics  
 proof of concept

WP4

WP3

# PARTNERSHIP

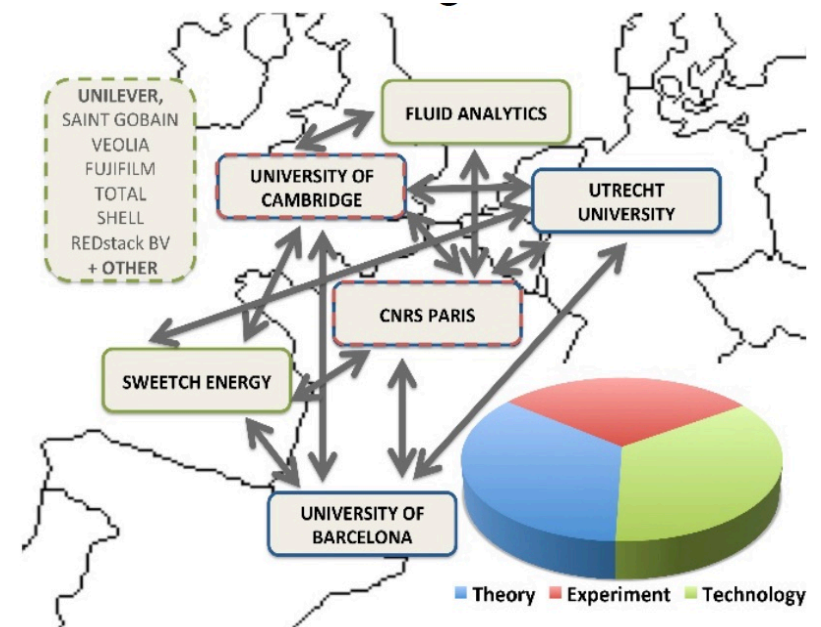
#	Institution Name	Country	Short Name	Sector	Principal Investigators
1	University of Barcelona	Spain	<b>UB</b>	Academic	Prof. Ignacio Pagonabarraga
2	Centre National de la Recherche Scientifique	France	<b>CNRS</b>	Academic	Prof. Lyderic Bocquet, Dr. Benjamin Rotenberg
3	University of Cambridge	UK	<b>UCAM</b>	Academic	Prof. Daan Frenkel, Prof. Tuomas Knowles
4	University of Utrecht	NL	<b>UU</b>	Academic	Prof. René van Roij
5	Fluidic Analytics	UK	<b>FA</b>	Private (SME)	Dr. Andrew Lynn
6	Sweetch Energy	France	<b>SE</b>	Private (SME)	Dr. Bruno Mottet, Dr. Pascal Le Melinaire

Total budget: 3.300.000 EUR

Presented 4 times:

STM-NANO (4.60)  
 NANOPHLOW (4.80) (4.60) (5.0)

Excellence:	4.50	5.0	4.50
Impact:	5.0	4.50	5.0
Quality and efficiency the implementation:	4.50	4.50	4.75



## Excellence:

Identify implications of known general transport phenomena

Lack of fundamental understanding

Connect systematic approach with clear outcomes

Interdisciplinary character

combine efforts of all partners in all WPs

## Impact:

Variety of dissemination measures

Knowledge transfer facilitator

Strong implication of SMEs

realistic translation to market

external support Unilever

Implication SME: responsible in WP tasks

## Quality and efficiency of the implementation

Realistic resources

Clear WPs:

research and innovation / project management / dissemination

Risk management

Excellence:

Too ambitious

redimension number of applications/outcomes

clearer focus

better distinction partners/supports

Protein separation application

less defined

clear cut different with existing microfluidic technologies

Impact:

Balance between fundamental advances / implement exploitation

Unrealistic timing for WPs tasks

Innovation targets weakly defined



**Excellence:**

Integration with biology too generic

distinction multi-application / interdisciplinarity

just above: multidisciplinary as a strength

**Impact:**

How dissemination will help to achieve expected impact  
not enough detail how to achieve impact beyond research world

Quality and efficiency of the implementation: 4.50 4.75

No weakness → 4.75

costs for IP / Software licenses

*Part of this project is based on an article that deals with boron nitride nanotubes as potential membrane media for osmotic power harvesting under salinity gradients.*

*Another goal relates the ability to probe and separate proteins and their complexes.*

*At first sight this seems indeed a novel approach, however how to interrelate the two parts is not clearly articulated.*

*The path to follow in order to get to the final goal is not clearly defined: the project is too vague. For instance the very serious issues related to protein aggregation are mentioned, however there is no clear description in how this problem will be tackled.*

*There is no relation between motivation and outcome, namely health and energy.*

*The scientific research is better defined in the work packages responsibilities section.*

*All information is given in very broad lines and in general the project lacks a research-strategy-achievement plan.*

*Novel approaches to energy and healthcare are mentioned but not delineated.*

*A number of achievements are listed, however a clear pathway in how such results are going to be put together to boost product development and how these are going to impact society in general is missing.*

*The achievements and originality of the research is only outlined in the work packages responsibilities section.*

*The authors mentioned that phoresis is inherently interdisciplinary, however they are not at all clear in how the project itself fulfils the criteria.*

*How are the partners going to interact and what is the real added value? These points are not considered.*

*It is mentioned that interdisciplinarity is a key parameter for development of this project however it is not well-defined how the academic output will be used as an input for technological development, and/ or what kind of technological question can be a answer using a particular or unique academic result.*

*The added value due to the interdisciplinary approach is better considered in the work packages responsibilities section.*