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# Morphological Study of Cyclopentane Hydrates in Brine Solutions for Desalination Application

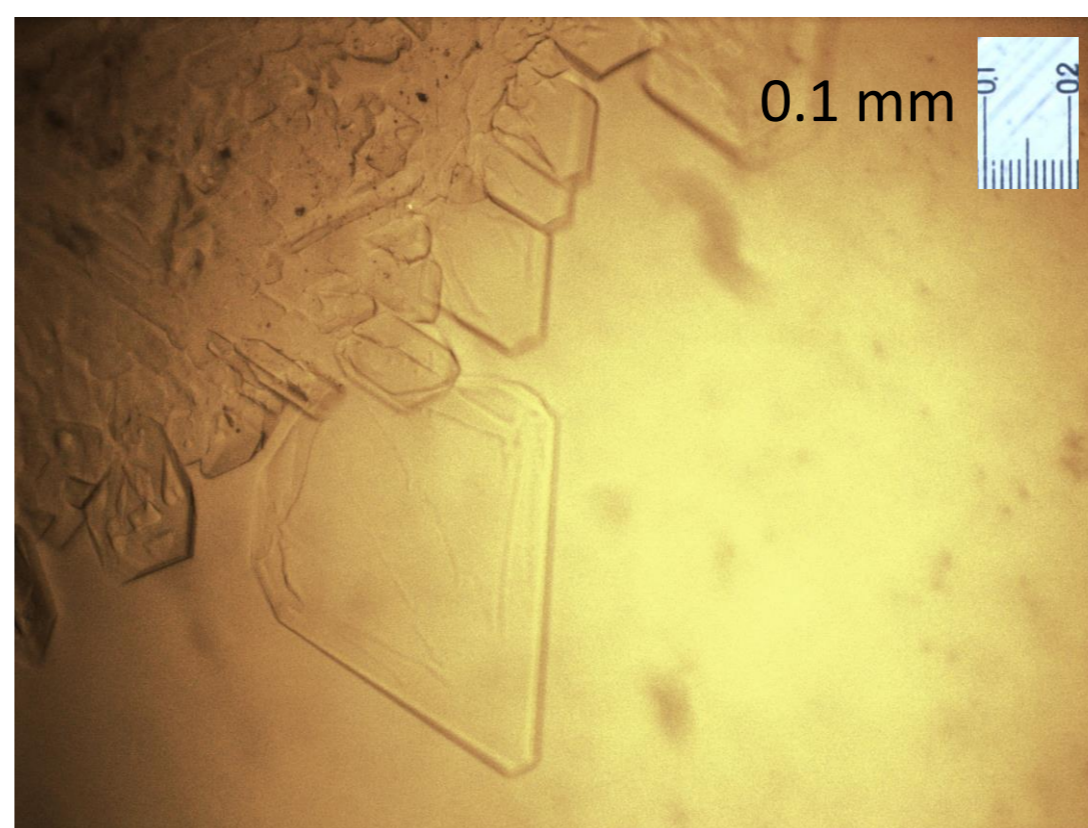
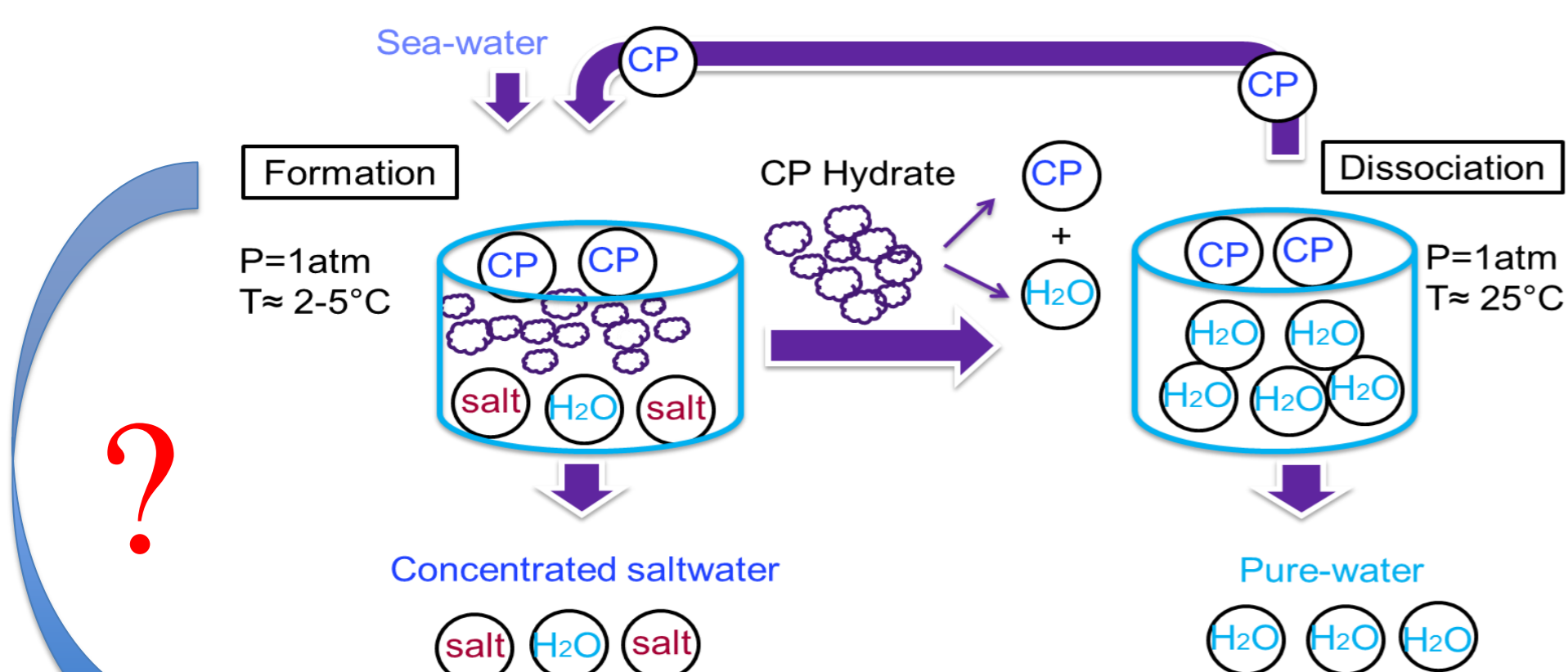
Son Ho-Van<sup>1,2\*</sup>, Baptiste Bouillot<sup>1</sup>, Jérôme Douzet<sup>1</sup>, Cameirao Ana<sup>1</sup>, Garcia Daniela<sup>1</sup>, Saheb Maghsoodloo<sup>1</sup>, Jean-Michel Herri<sup>1</sup>

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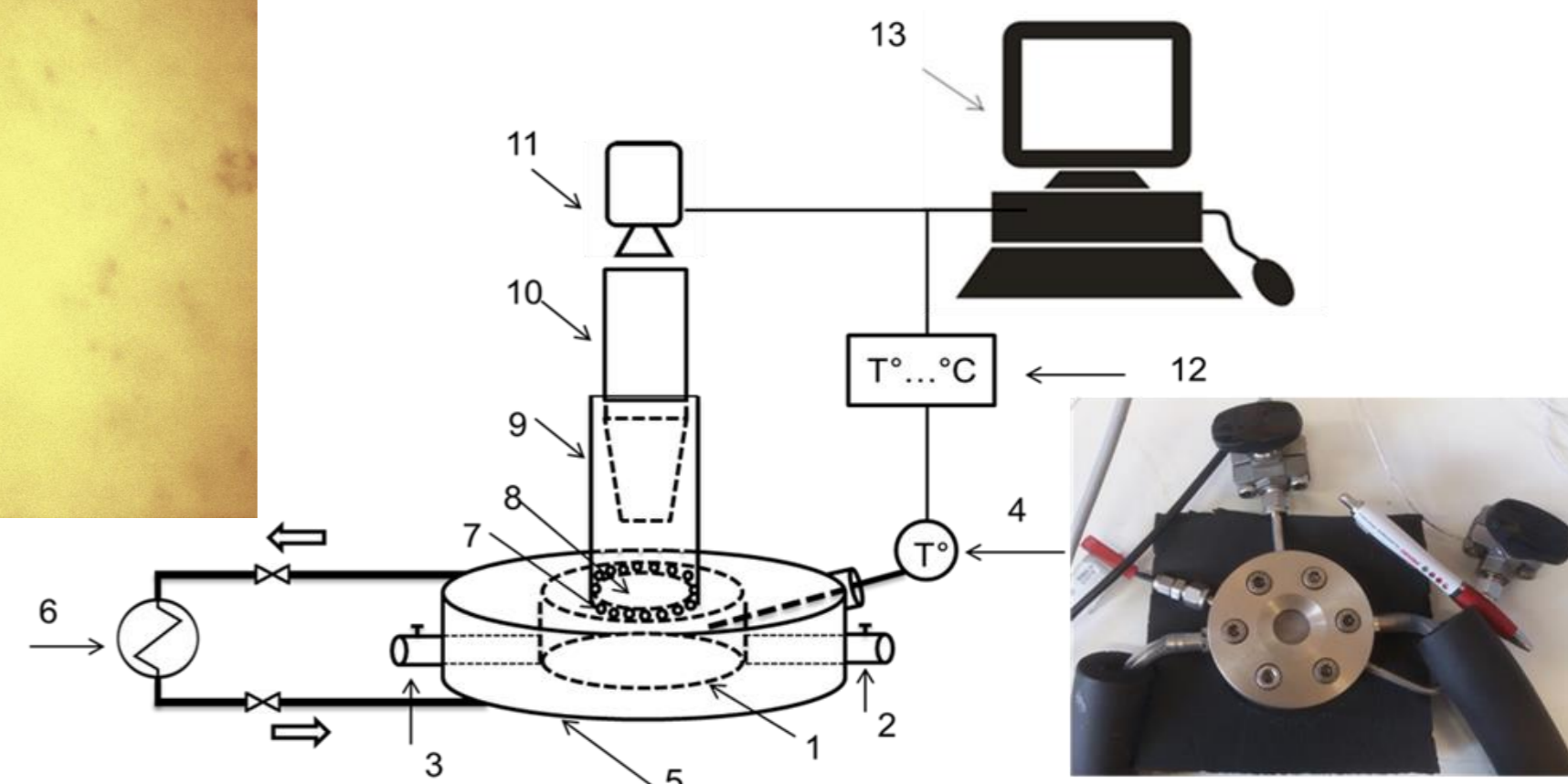
## Introduction

Cyclopentane (CP) hydrates-based desalination



CPH crystals

## Apparatus

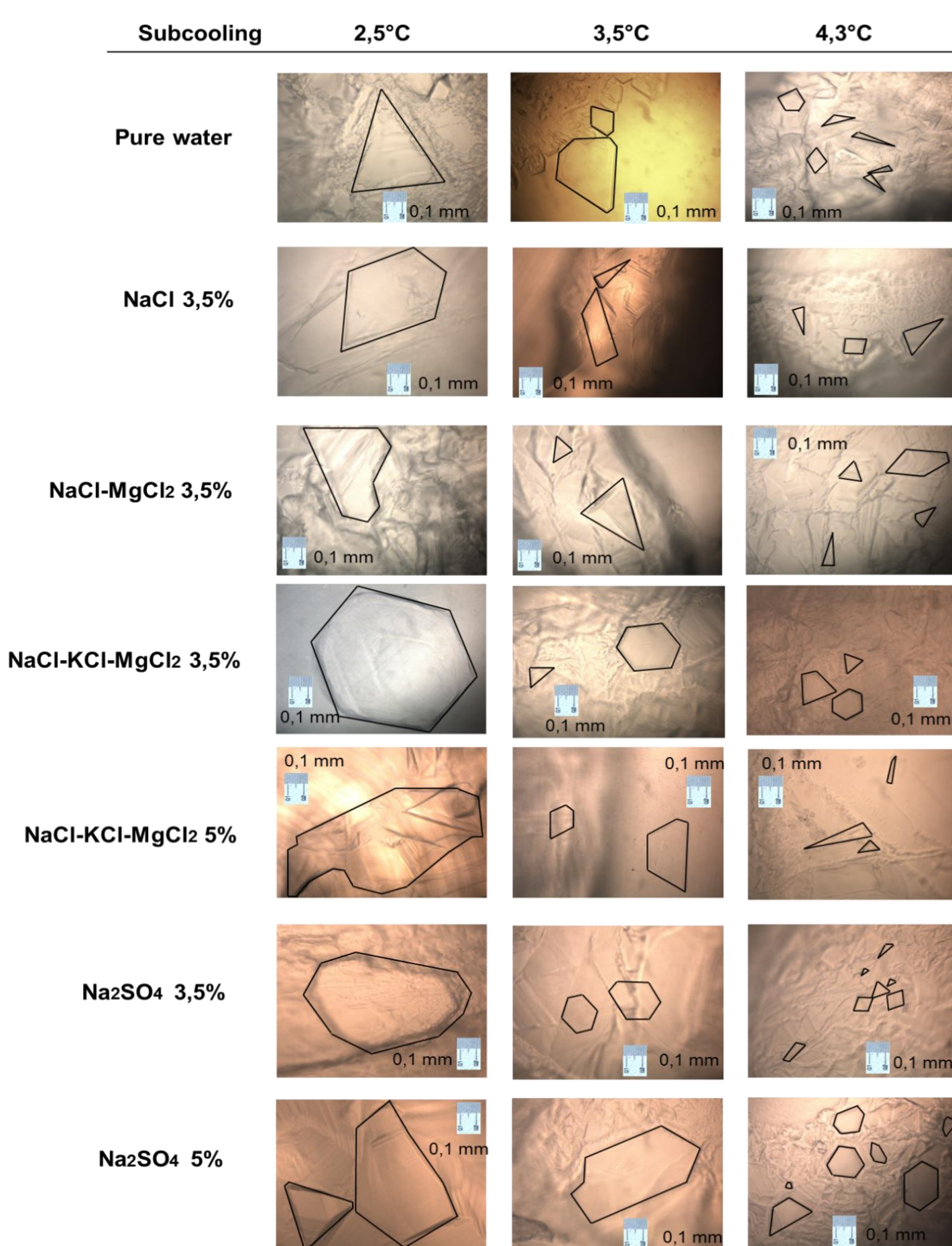


(1) Reactor; (2) input line; (3) output line; (4) Temperature probe; (5) Cooling jacket; (6) Chiller; (7) Silica gel; (8) Glass window; (9) Transparent tube; (10) Objective lens; (11) Camera; (12) Temperature transmitter; (13) Computer.

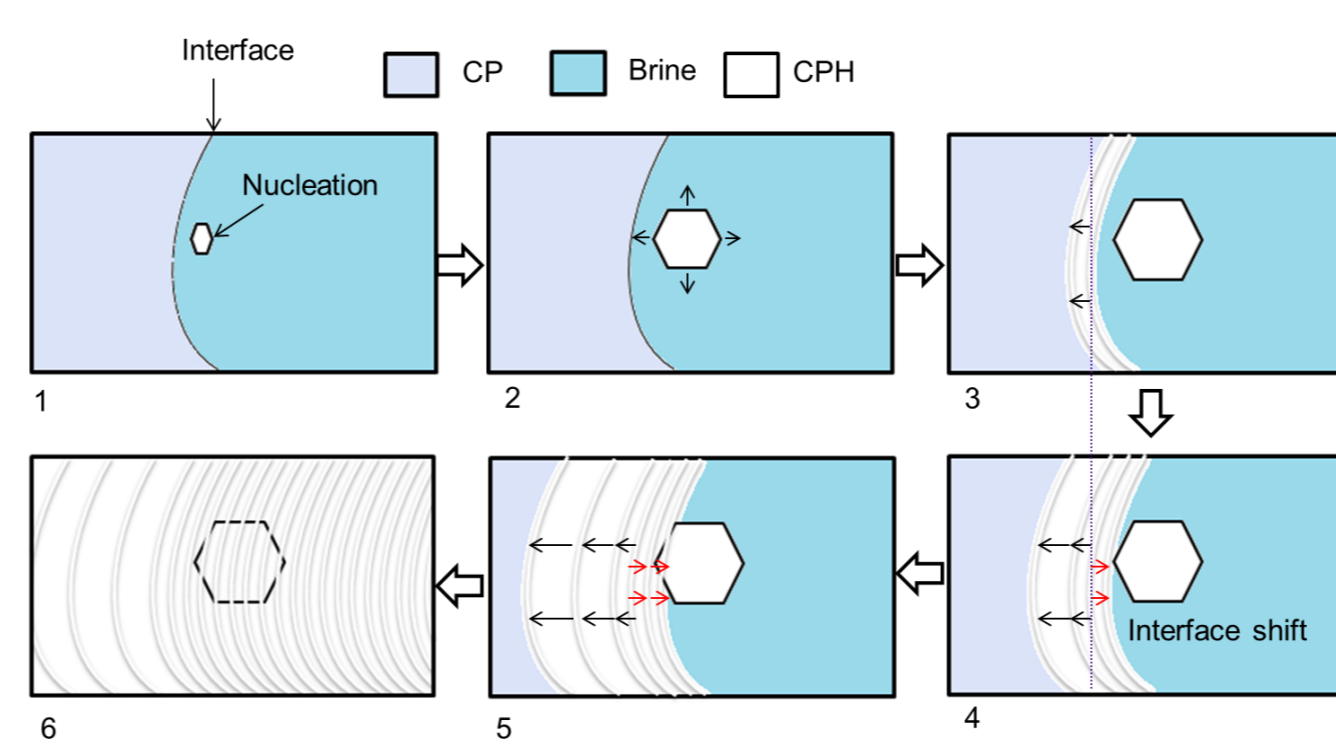
- ❖ Effect of salts & subcooling on morphology, kinetic of CPH crystallization?
- ❖ Mechanism of CPH crystallization?

## Experimental results

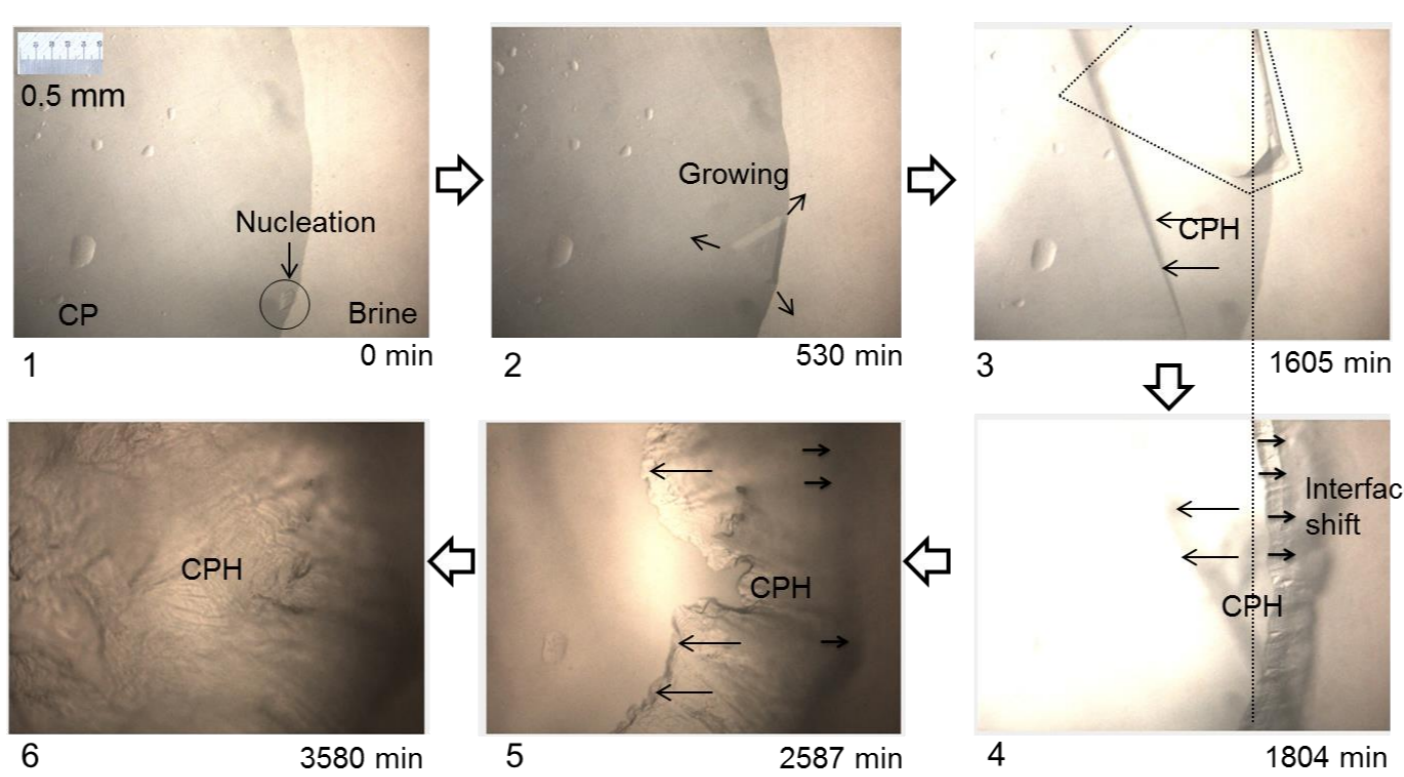
### Morphology of CPH



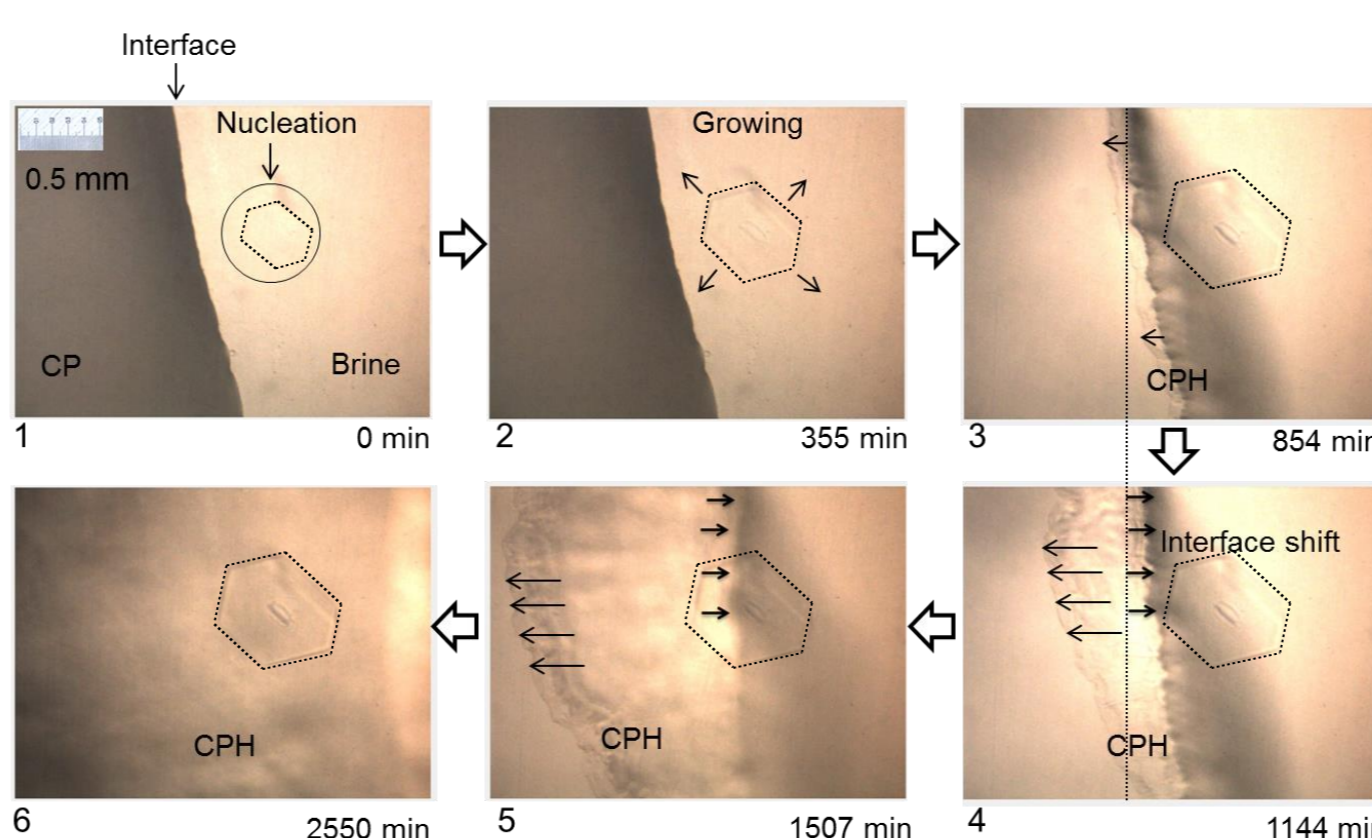
### Mechanism of CPH Crystallization



Simplified schematic of the CPH crystallization mechanism

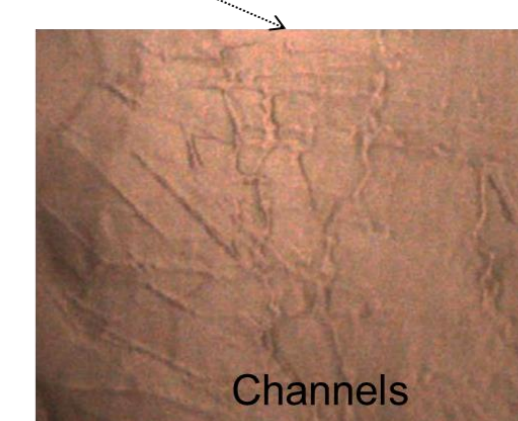
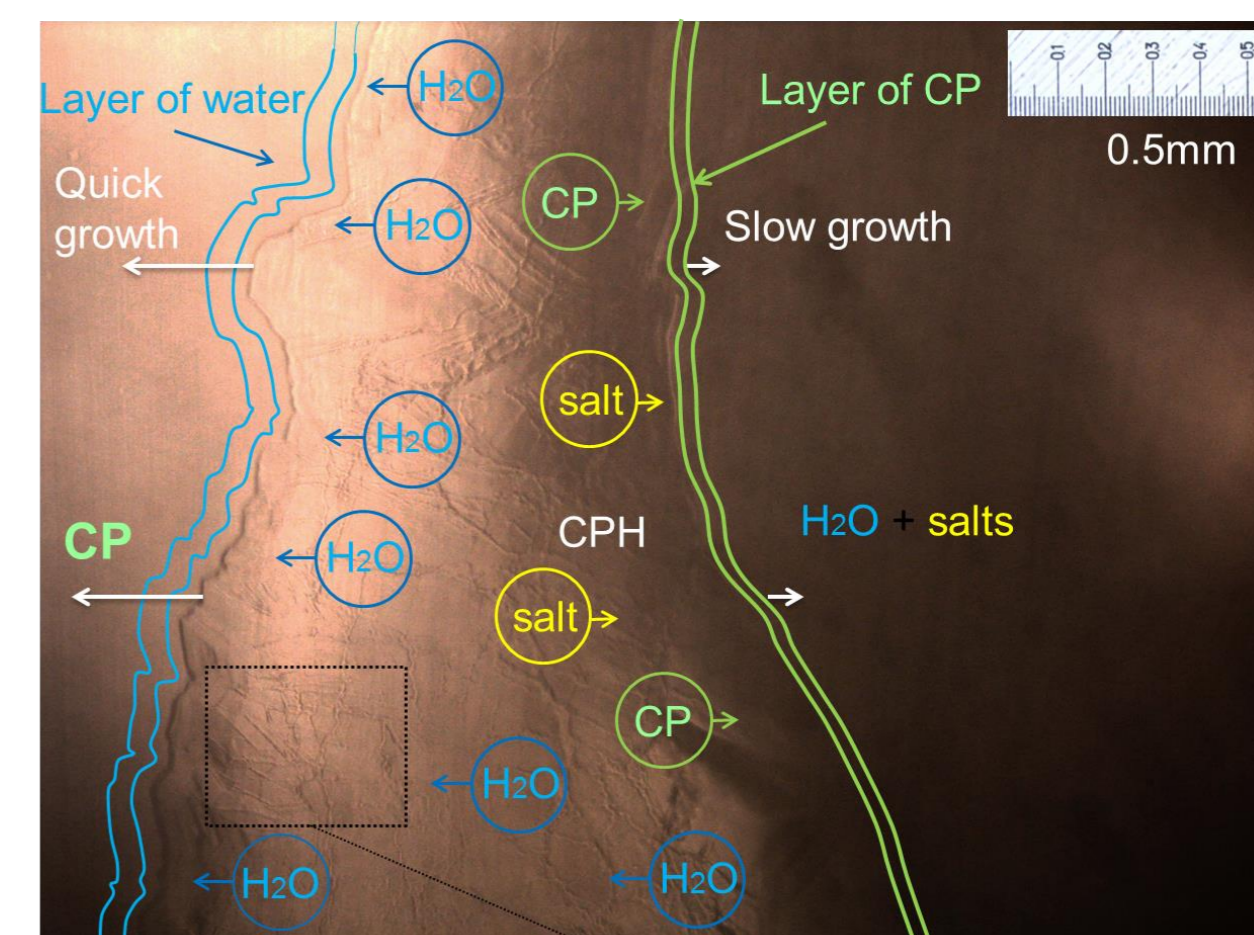


With pure water at a subcooling of 2.5°C



With NaCl-KCl-MgCl2 5% at a subcooling of 3.5°C

### Mass transfer across the hydrate layer



## Conclusions

- ❖ Size of the individual crystals decreases when increasing subcooling
- ❖ Salts reduce the growth rate
- ❖ The growth rate is proportional to subcooling

### Kinetic of CPH crystallization

