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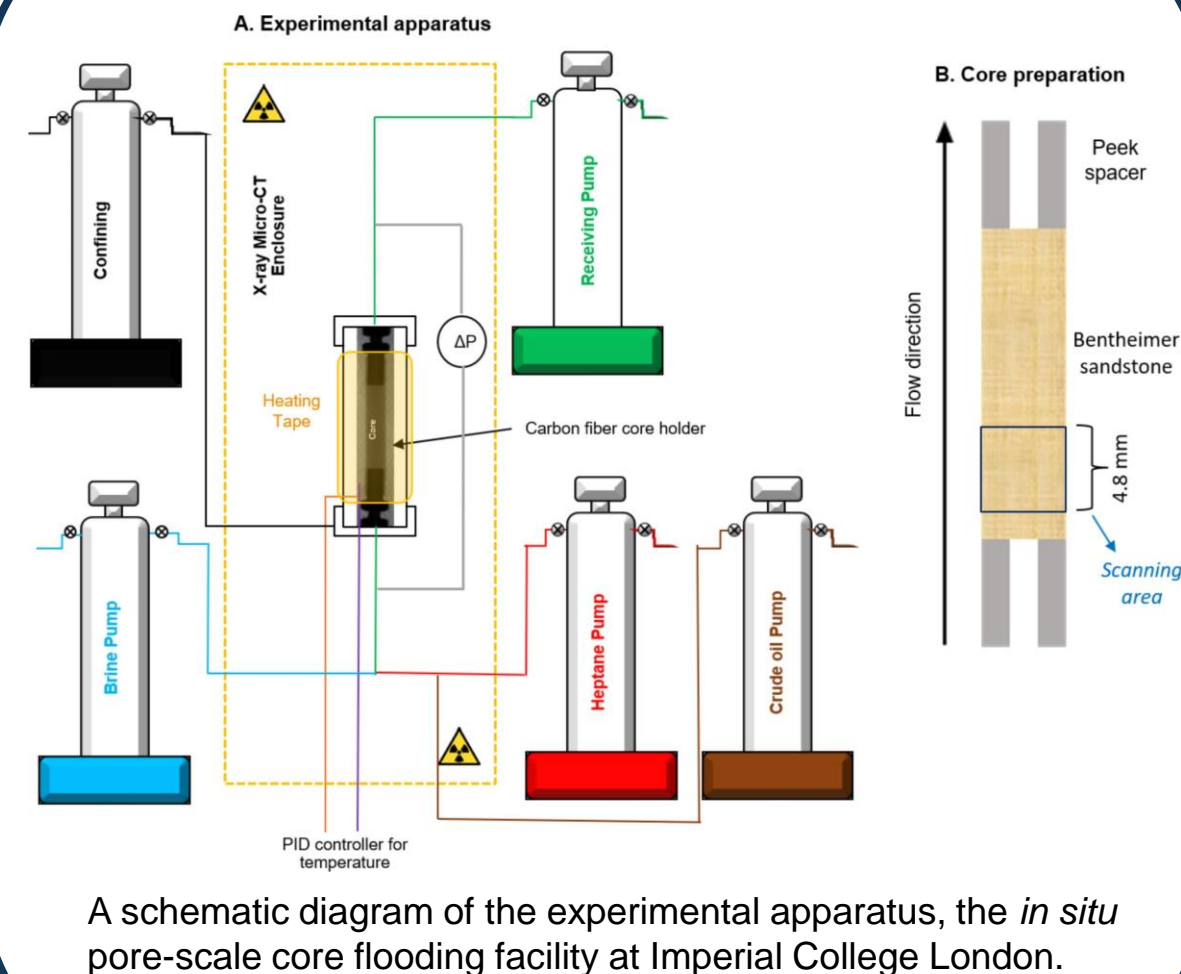
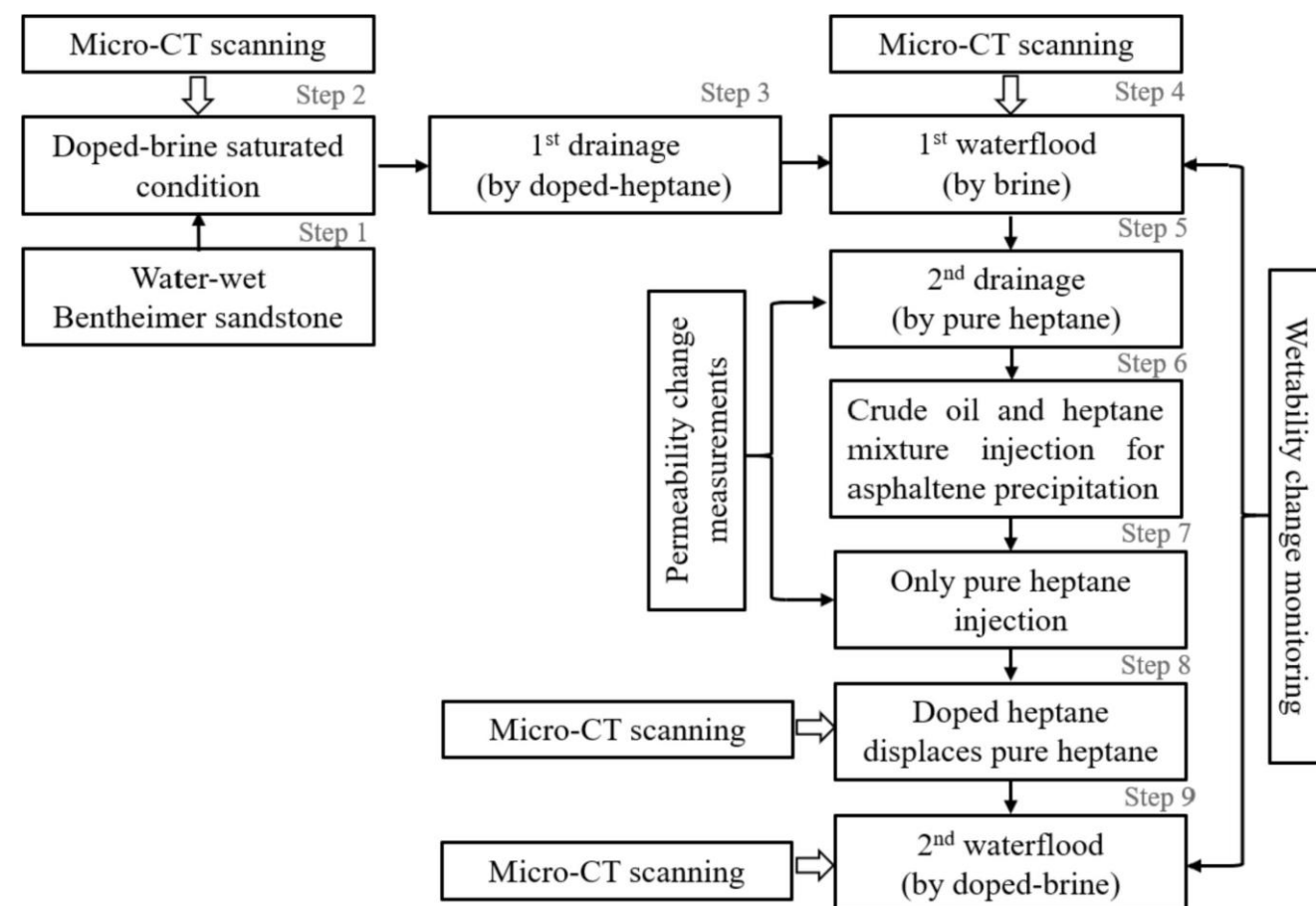
³Japan Oil, Gas and Metals National Corporation

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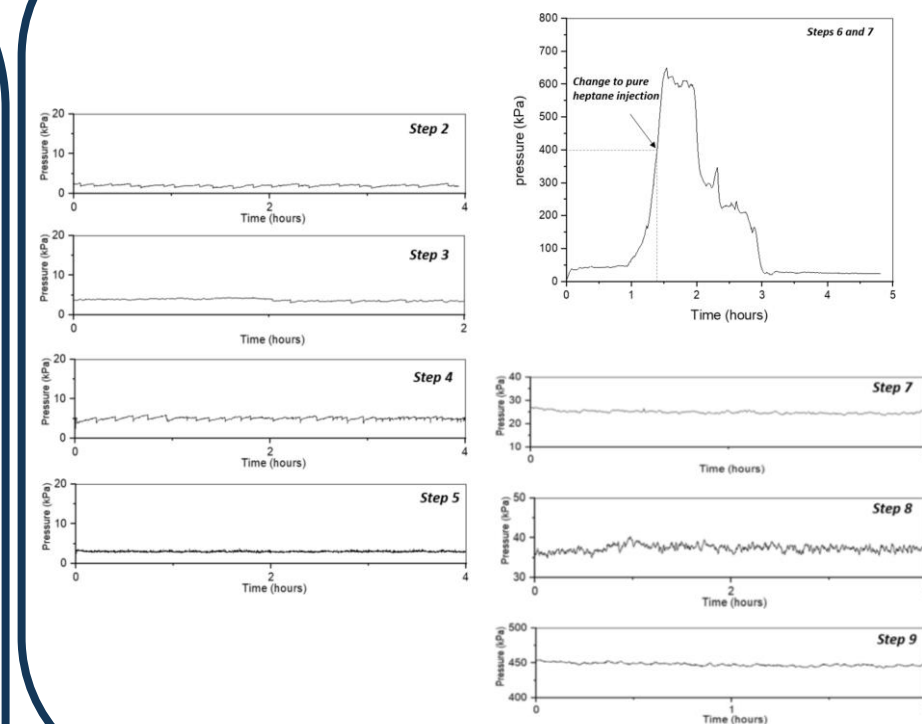
Introduction

- ❖ The precipitation of asphaltene from crude oil causes clogging in pore network and fractures, resulting in a reduction of permeability.
- ❖ The reservoir wettability changes after asphaltene precipitation.
- ❖ The novel in-situ pore-scale scanning in this research

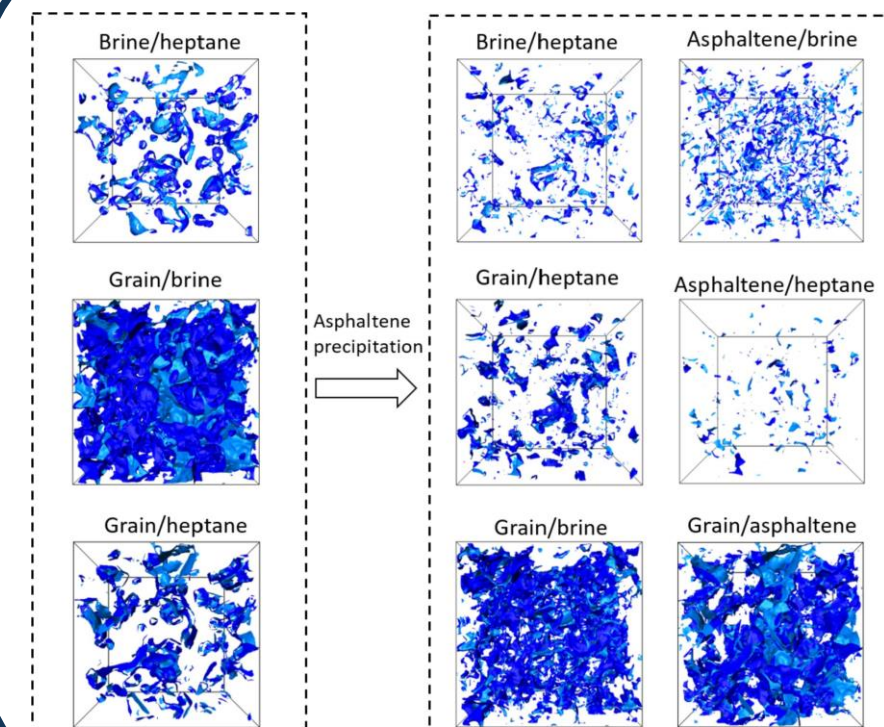
Methodology



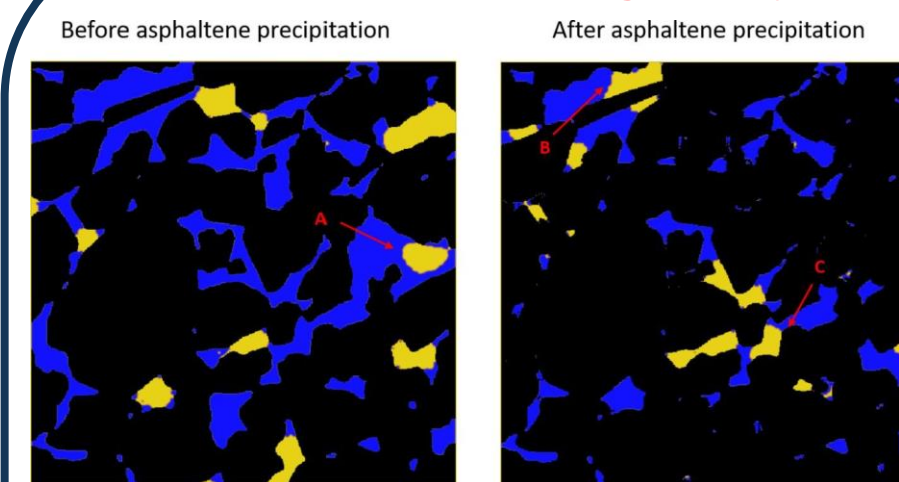
Results: pressure recordings



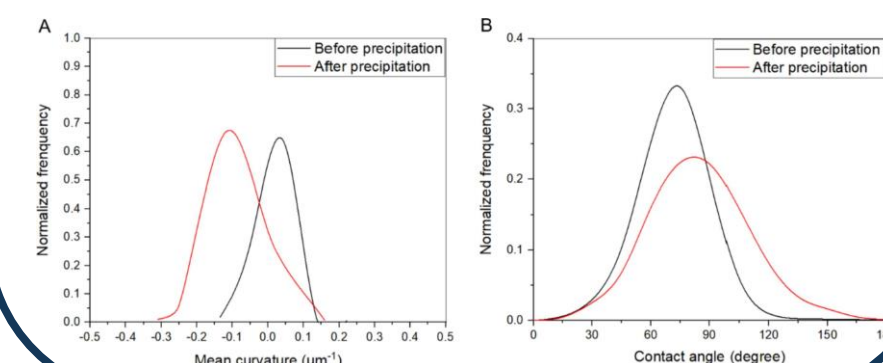
Interfacial area



Curvature and contact angle analysis



Example of brine/heptane curvatures on 2D image slices before and after asphaltene precipitation: (left) positive curvature indicating water-wet conditions, A; (right) negative, B, and zero, C, curvatures indicating oil-wet or mixed-wet conditions. Blue is brine, yellow is heptane, and black is solid rock or asphaltene.



Conclusions

- ❖ Asphaltene deposition has been observed *in situ* in high resolution.
- ❖ Asphaltene deposition largely dropped the permeability (90 times dropped from step 4 to step 9).
- ❖ Asphaltene deposition changed the rock wettability (confirmed from both curvature and contact angle analysis)
- ❖ More asphaltene deposited at the inlet area, with gradient for asphaltene fraction along the flow direction.

